THE
NATURE ALMANAC

A HANDBOOK OF
NATURE EDUCATION

AMERICAN NATURE ASSOCIATION

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A HANDBOOK OF NATURE EDUCATION

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THE LOVER OF NATURE

Edward A. Preble

To the nature lover the universe constantly pours out its wealth. Daily he gathers the fruits of seed sown in the beginning of the world.

For him no season is dull, for each is successively absorbing: In Spring he is entranced by the awakening of myriad forms of life: Summer reveals the maturity of all creation: Autumn brings the fulfillment of earlier promises: Winter lulls life to sleep, with its assurance of the resurrection.

All weathers are one: The rains of Spring nourish all nature: the heats of Summer mature and ripen its fruits: the frosts of Winter give rest and peace: in all he rejoices.

Each day is good: In the morning life awakens with him: through the noon it works: the peace and quiet of evening shed their benediction upon him.

He knows no dull moments: he seeks not to hurry time. If he be delayed, he may discover something never before seen by man, and his impatience is forgotten.

His youth is filled with the joys of discovery: in middle age the marvels about him hold his interest undimmed: he awaits old age with calmness, for he is one with the universe, and is content.

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WHY NATURE EDUCATION

Arthur Newton Pack

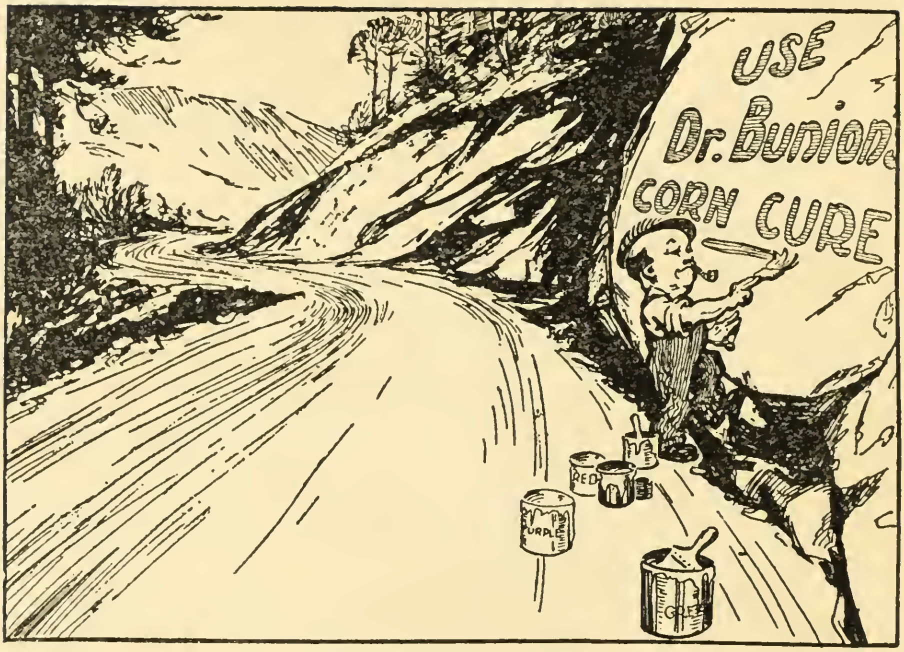
President, The American Nature Association.

In early American history, Nature Education went hand in hand with the three R's. To the pioneer, food and shelter, even life itself, depended upon keen observation of nature's ways. The American frontiersman learned to know thoroughly the trees, the stars, even the habits of the smallest mammals and birds; and the obtaining of that knowledge, the acquisition of that experience often necessarily took the place of other education. To-day it is not necessary for us to understand the ways of nature to protect our lives from wild beasts and marauding Indians, but dangers quite as great threaten society as a whole—dangers which can likewise be met only by a careful study of nature and of nature's ways.

Abuse of woodlands and forests by means of carelessly started fires, scattering of tin cans and papers after a picnic, and plucking or pulling up of wild flowers is so prevalent that no argument can possibly exist as to the necessity of a cure. *Æsthetically, it is a public disgrace; practically, the waste and destruction involved constitute a national menace.* Newspapers and magazines regularly wage editorial and cartoon campaigns against this abuse of public and private property, but it is evident that careless habits are usually too deeply seated to be eradicated within a single generation.

What is the answer? Simply a question of elementary education. It should be the duty of our public and private schools to show each child " his place as caretaker in the world of living things." With elementary school training this thought should be instilled; in higher grades of school, in camps, and throughout all organized education the idea should be fostered and developed.

The conservation of natural resources is one of the great problems of the present day. More and more attention is being called to the absolute necessity of saving and properly utilizing everything out of doors—not merely for æsthetic reasons, but also for purely economic purposes. It is a well known fact that man is the most disturbing element in the balance of nature. The very conditions of civilization, particularly in modern times, make this almost inevitable. Without civilized man, natural conditions are reasonably stable; but as soon as he enters a region, profound changes begin to take place. He cuts down the forests, drains the lakes and the wet lands, kills the mam-

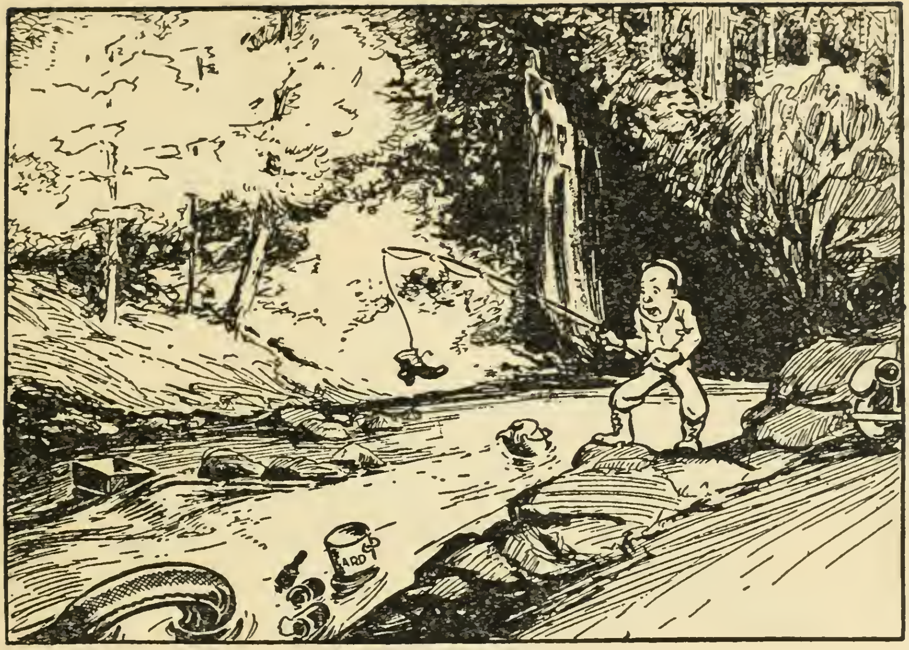


I LOVE THY ROCKS

mals and birds, and plows up the prairies to make room for agricultural crops.

Much of this change is necessary, but the results are nevertheless sometimes disastrous. We are using up our forest resources at least four times as fast as they are being reproduced. We are allowing fire to destroy both mature forests and promising second growth. There are a hundred million acres of idle land in this country—once forested, but now practically worthless for anything else. Great floods erode the valuable soil from barren areas. The tilling of agricultural soil stimulates the growth of weeds, which come into competition with the farmer's crops or other valuable vegetation. The destruction of beasts and birds of prey permits harmful rodents to multiply until they do untold damage to food crops and supplies. Man must, therefore, take a hand in the competition which he has himself set up, or he must see the results of his labors partly or wholly lost.

The teaching of conservation, upon which our national welfare depends, can only be properly conducted as part of a general nature education, for all living things bear a definite relationship to each other. No single economic phase can be properly understood without elementary ground work. We teach general science, biology, chemistry, and physics; but how much better they may be understood if their inter-relationship, their connection with life and living, can be

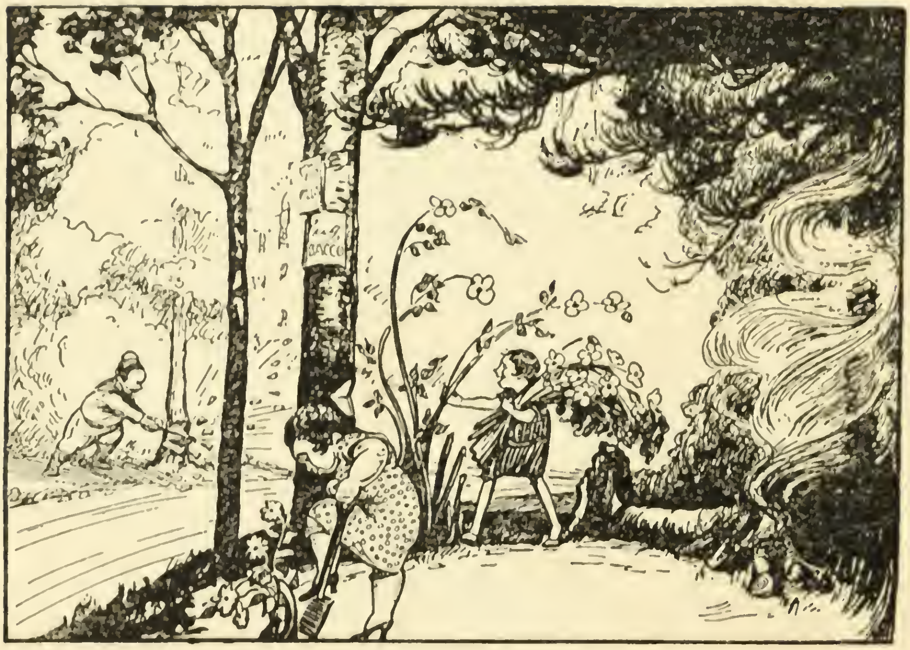


AND RILLS

brought out by teaching—first of all—Nature. How erroneous it is to suppose that elementary nature study is one of the refinements or luxuries of education, when upon it, as a foundation, science rests.

Forests, farms, minerals, birds, and mammals—all these we think of as natural resources to be conserved; but human health and energy are equally essential to economic welfare. Social progress and national virility have been proven to be dependent upon a proper amount of outdoor recreation. Life insurance companies are beginning to recognize this as a fundamental factor. Cities, states, and the federal government are creating and setting aside parks for the enjoyment of the people, only to realize that the people do not know how to use the great outdoor playgrounds and facilities made available to them. The story is told of a small boy from the tenements who was given two weeks in the country through the agency of some organized charity. When he arrived at the camping ground his first remark was, "Hell! There ain't no place to play here—they ain't got no paved street!" A tourist, who—after negotiating the steep road into the Yosemite Valley—stopped his car in front of Park Headquarters, remarked, "Well, here we are; now let's start for Yellowstone Park." Neither of them, boy or man, could appreciate the magnificent opportunities right at hand.

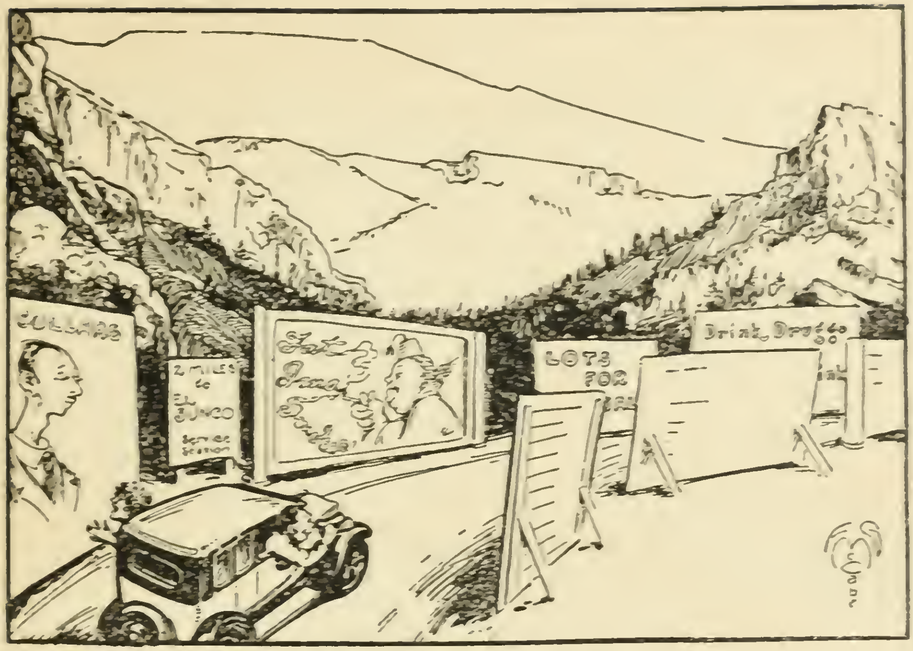
"How to make a living" or "how to live"—which is the more



THY WOODS

important knowledge? There are those who would have us believe that a scientific or trade education is the only thing really worth while. On the other hand, judging by the number of students clamoring for admittance to our great universities, education in those arts which have no immediate money making purpose continues to grow in popularity. Study of the ways of nature falls equally in both categories. In so far as Nature Education includes training in the appreciation and wise use of our natural resources, it is inextricably knit with fundamental business economics. In so far as it develops and trains the mind to appreciation of beauty, it becomes truly, not a science, but an art, stimulating spiritual growth and having as its object a fuller living.

Nature Education is a general term covering a multitude of corollaries. Some may prefer the term " Elementary Science " others may lean to the simpler " Nature Study "; leaders of outdoor camps may advertise " Nature Lore," endeavoring to escape from the bugaboo of the word " study " in presenting the delights of the out-of-doors. At all events, Nature is best taught—so far as possible—by direct experience, with immediate environment as the principal text book. Only methods of approach may be presented upon the printed page. Thus, when Nature Education seeks to assume its rightful place upon some school curriculum, arise "educators" of the old school and even indignant parents, who, witnessing the delight of



AND TEMPLED HILLS

children in the direct contacts established, cry aloud that not for this are taxes paid and children sent to school. For some curious psychological reason a portion of the American public has believed that good education, like effective medicine, must be unpleasant to take. The one idea is as mistaken as the other. The aim of education is not the memorizing of words, dates, and facts, but among other things the development of the ability to observe clearly and correctly, and to reason or deduce from that which has been observed, without slipping into the pitfalls which are as ready for the careless thinker as for the careless performer. This is at least one aim of school nature work.

The complexities of civilization lead us continually around the corner to confront Nature either as enemy or friend. No graver error can be committed than to overlook the fundamental laws of balance exemplified in Nature and now so clearly crystallized in flood problems and forest destruction. Not one individual may be found for whom these issues do not affect the cost of living. No political clap-trap, not even engineering marvels, can establish a permanent solution of such problems. They will remain to be solved by a generation wise in the laws which make the world of living things—a generation fundamentally grounded in Nature Education.

A NATURE CALENDAR

E. Laurence Palmer

JANUARY

Emerson says, "We can never surprise Nature in a corner, never find the end of the thread; never tell when to set the first stone. The bird hastens to lay her egg, the egg hastens to be a bird." So it is with the months of the year. January hastens to February and so the months follow on to January again. One may find reasons for beginning the year in any one of its months, but we hope that this section will give a picture of the year not only where the particular reader may be, but where all of the probable readers of this may be. As Emerson continues, "The wholeness we admire in the order of the world is the result of infinite distribution."

There are reasons why we might begin our year in January other than those of custom. It is during January that there is a minimum of migration of our birds. The bird population at the beginning and at the end of the month is very much the same. At least it is much more so than it will be in the months to follow immediately.

In the far west the wren-tits will begin to sing in the canyons before the end of the month and the Nuttall's white-crowned sparrows will begin making themselves a bit more conspicuous than they have been previously. In the east, juncos and tree-sparrows with now and then some snow-buntings will be gathered around the pigweed lunch counters, while the nuthatches glean from the tree trunks, and the golden-crowned kinglets are active among the branches of the evergreens. Families of bob-whites stick closely together in covies and possibly thank their stars that occasionally there are good people who will help them now and then with food when the snows are deep. The grouse are feeding on the buds of trees when nothing better offers, and the pheasants, if luck is with them, are eking out a living from the few spots not covered with snow or doing the best they can on comparatively empty stomachs.

While most of the birds are doing nothing about the next generation some forms of life are in the very midst of reproduction in January. Out in the sea the codfish are spawning and in the warmer fresh-waters of the southlands pickerel are beginning to move into the shallower waters to lay their eggs. Pike caught through the ice in northern waters have eggs sufficiently developed to be ready for laying within a month.

Most of the frogs are safely underground during January, though in the southwest tree-toads may be heard calling on the rainy nights.

The snow-covered woods may be brightened now and then by a mourning-cloak butterfly misnamed because its presence brings thoughts of cheer to us rather than of sorrow. To be sure, at a distance the butterfly looks as though it were mostly black, but this opinion is changed when one has the chance to look at the inner wing surfaces at close range. The willows that may have fed the caterpillars of the mourning cloak last summer now may bear the pine-cone-like galls that furnish food and shelter to more than one gall maker. At the same time, plants like the cattails and goldenrods and oaks and others are conspicuous because of the bizarre homes of other gall makers that distort them in one way or another. Strangely enough each kind of gall-maker produces a house so typical in shape that the occupant may be named without even opening the gall house in most cases.

The silver maples in the east may begin to show swollen flower-buds if they haven't already done so before the first of the year. Along the west coast acacias may appear in flower before the end of the month not only in the open country but in the flower-shops as well. At the same time the highlands a few miles back may be deeply buried in snow. The lower hills of California that were so grey in the summer are now the brightest of greens. In the east the snows may be covered with the little bird-like fruits from the birch trees which are being shed at the same time the staminate catkins are beginning to swell, to help in the production of next year's crop. In Florida, Arbor Day is being celebrated.

Tumbleweeds grace the fences from one end of the continent to the other though the species or even the genus is not always the same, since many weeds spread their seeds or fruits by the tumbleweed method. Under the snow the green leaf-rosettes of many weeds lie ready to make use of the first moment that the snow may vanish. The trees may show lichens at their best during late January and they are worthy of study, since the reindeer moss of the far north is a lichen that furnishes food for many animals that would otherwise be unable to survive the winter.

Not all mammals attempt to survive the winter by being active, however. The bears may be "holed-away" in a hollow stump and give birth to their cubs during January. Meanwhile the wolves outside are concerned with the winning of mates for the year. White-footed deer-mice skip about over the snow or enter into the diet of some starving carnivore, while shrews are even more active, digging tunnels in the snow for the food which their insatiable appetites demand. During all these festivities the snow king reigns supreme if any king can ever safely consider his reign supreme.

FEBRUARY

February, the shortest month? Yes. The least important? No. If a month could be judged by the things it starts rather than the things it accomplishes February would easily draw a high rating. Now come the northern migration of birds that leads to or ends in the establishment of bird homes, the awakening of many insects which may serve as food for those birds, the birth of young mammals that may feed on the birds that eat the insects, and even the starting of the buds that may serve as food for the insects. All these things make at least some pretense of a start in February, though few really "hit their stride" until later.

February is the month when many of the owls have selected their mates and have laid their eggs. Even the horned larks may have started nests under a clump of grass near a snow-bank at some time during the month. Most of the birds, however, have not felt the urge which it is believed by some is caused by the longer hours of sunlight. A few bluebirds and robins may begin to make their way north during the month. In fact, many may be in the north by the end of February but not infrequently this is a case of fools rushing in where angels fear to tread and too frequently the early bluebirds and robins fail to get the worm and join the angels when a storm comes along. This of course is assuming bluebirds and robins become angels when they die, an assumption which is probably rather dangerous and wholly without scientific backing. While the easterners are cheered by a bluebird now and then in February, not a few westerners may begin to see humming birds and find that their duck reserves are beginning to be abandoned by some of their winter boarders. By the end of February the downy woodpeckers may begin drumming or calling to one another in a poor imitation of the furor to be created later when the flickers arrive and take things in hand. This of course is not to be taken that no readers of this will be unable to see flickers in Feburary. Unlike our ancestors we know that birds do not spend the winter by diving into the mud and remaining there until spring and the flickers that arrive in March in the north have not been out of the country at all. Instead, not unlike many humans, they may have moved south just a comparatively few miles to avoid the more severe weather.

While these things have been going on among the birds, the insects may have begun to show increased activity. The fenceposts along some brook may seem to be alive with hosts of crawling stone-flies. The snows may be dotted with jumping snow-fleas, and the air over the brook may be filled with small clouds of dancing midges. Meanwhile many of the aquatic insects are continuing their activities underwater as unconcernedly as if there were no such thing as winter. This unconcern may be rudely upset when the ice comes downstream scouring the stones on the bottom as persistently as the proverbial dutch housewife, but there will always be cracks and crevices which cannot be reached and in these will survive those individuals which will have more freedom from competition when the floods have passed. The cocoons of many of the large moths which may fly about on early summer nights may now be conspicuous at the end of twigs of trees and shrubs. Though they seem conspicuous, they are in little danger of being despoiled by birds since they swing free in any direction at any blow of a driving beak.

Salmon are beginning to run up the rivers in the west while the eastern rivers which formerly held them are now well filled with refuse from manufacturing plants. As a result the easterners get their salmon from cans instead of from fresh-water streams, which themselves may be full of tin cans.

By February, a few snakes may become active in the warmer parts of the country and ground-squirrels of many kinds may begin to make their appearance and open up their dens. The woodchucks may begin to make tracks about the entrances of their burrows, and muskrats and beavers may mate for the season in this month. It is thought that the beavers mate for life. Buck deer will have shed their horns by February and look quite different from the creatures of the fall months.

In the swamps, the skunk cabbages will begin to show through the open patches in the snow, their hood-like caps reminding one of the entrance of a hotel, but their odor being of such a nature that few of us would care to enter such a place. Mosses of many sorts may show the swollen tops that bear the sex organs in February and not a few species may have progressed so far in their reproduction as to have produced the spore capsules which are always so interesting once one has watched them work.

Pussy-willows will be in vogue in many a vase in February, though in the far west and in the south many willows may have passed the "pussy" stage and begun to deck themselves in leaves before the month is very far advanced. Elm buds will have swollen so that there may be little difficulty in choosing between the larger ones which will produce the flowers and the smaller leaf-producing buds.

Peepers may begin to make themselves heard and not infrequently leopard frogs may be found, in or near open springs, sometimes killed by a change in February's uncertain weather. By the end of the month such a condition would of course not be so likely to end in a catastrophe, since there would be more open places into which a safe retreat could be made.

MARCH

Where a few hardy or foolish individuals began to show signs of activity leading up to their summer work in February, many make a real beginning in March. Insects, mammals, birds, woody plants and herbs "snap out of it" and set about the summer's work.

In the pools of March the egg masses of the silent spotted salamanders will begin to make their appearance while the eggs of the noisy peepers remain even more hidden than the adults that produced them. Leopard frogs may be giving their peculiar grunt which, to them, is probably as musical a love song as the peepers call which appeals to us. In all these frog choruses, of course, only males are admitted and like the males of our species they differ from the females in the gaudiness of their neckwear generally. Almost invariably the throats of female toads and frogs more nearly approach the "lily whiteness" spoken of in a certain type of poetry than is the case with the yellow-throated or black-throated males.

During March the great vanguard of the spring migration of birds begins to make its appearance. We wake up some morning and find the birds that have been in the south for the winter now establishing their homes near ours, in spite of the fact that we may harbor their worst enemy, cats. By the end of the month the flickers will have become more noisy and the crows will either have won their mates and built their nests, or be talking it over with one another in voices that to most people don't sound like those of crows at all. It is at this time of year that you can most easily locate crows' nests, because they are not now hidden by the leaves and the birds may be watched for considerable distances through the woods. The northern movement of water birds will become more and more marked as the month of March advances. The waterways of the west may be made conspicuous by the great hordes of little ruddy ducks, the white faces of the males glistening in the sun, though the birds may be far from land. If the birds are closer to shore you may notice their conspicuous blue bills and the stiff pointed tail feathers which they spread like a fan in their courtship antics near the more somber females.

Bees will have become active by March though much of their gleaning may center around the tree tops. Not infrequently their humming about the top of a silver maple may call your attention to the fact that the tree flowers have burst open. Spring cankerworms may be fluttering about our shade trees or in the woods looking for the wingless females that must climb the tree trunks to lay their eggs on the twigs of the trees after having mated. Not a few cabbage butterflies may make their first appearance in March. This may not be the case in the snow-bound north but it certainly is the case in the south. On a few of the warmer days, house flies and other flies may make their spring appearance and should meet with warm welcome in the shape of a paddling with a fly swatter.

On the west coast the hills will be in their glory. California poppies will make great yellow patches against the brilliant green of the hillsides and many of the fruit orchards will be most attractively flower-bedecked. In the east, the woods show patches of snow with now and then an equally white patch of blood-root flowers. While this is going on, the higher mountain regions are still well covered with snow. The mud flats about Great Salt Lake that a few months later will be well populated with breeding shore birds will still seem comparatively deserted, and the mountains that in June will be masses of color with flowers are still under snow. Eastern woods may be brightened now and then by the little scarlet cup fungus that adds a touch of color to some otherwise inconspicuous dead stick of the forest litter. The fungus is doing its part in helping clear the forest floor to make room for other plants. Possibly you may tap the stick bearing the scarlet cup and see the great cloud of spores which may drift away to find other sticks to conquer.

Snakes may begin to awaken even in our northern states, and musk turtles and snapping turtles may begin foraging about at the edges of ponds and other bits of fresh-water.

By March, cotton-tail rabbits will have had their first litter of young that may be now tucked away safely in a shallow form among the grasses of a meadow or even on a lawn. Muskrats, and many kinds of mice, will have become burdened with their family cares and possibly more interested in their litters of blind young than in anything else. Black bears will come out of their dens or stumps, the mothers leaving their diminutive cubs for comparatively short intervals. If they have luck they may be able to scoop out some big suckers that have run up into the brooks from the deeper lakes to breed. In the far west, a meal may possibly be easily secured from a salmon that has filled its mission in life by laying its eggs and has then died and been washed ashore. Young raccoons may be tucked away in a hollow tree or rocky den while the adults forage along the waterways or pick up whatever type of food may suit their varied diet.

While a very few woody plants in the northern part of the country will be showing rather conspicuous signs of developing the summer foliage, the general aspect of woodlands is still one of winter. Buckeyes, poplars, willows, acacias and sumacs in the south will seem to be jumping out of their buds to make a showing before the other woody plants get fairly started.

APRIL From the standpoint of migrations and beginning summer's activities ahead of time, April is not so much a month of fools as the months that have just preceded it. The weather begins to wear the ear-marks of summer at intervals, at least, and generally permits you to put your ear-muffs away until another season. The winter birds have for the most part departed for the north, at least by the end of April, and the spring transients and summer residents have begun to put in their appearance. The blackbird chorus that started in the marshes in March may reach a climax during April or dwindle to little as soon as nesting activities are well under way. This does not mean, of course, that you will be deprived of the cheerful "kong-ker-ee" of the red-wings when you visit the swamps in April. It is nice to know that it may continue to be heard for a long time yet.

Robins will have selected their nesting sites, built their nests and put in them a few eggs during April if all goes well. Phoebes will have renovated last year's nest under the eaves or under the bridge and will have begun to quiet down a bit, providing a phoebe can be quiet, tail and all. At least this is the story by the end of the month, Grouse will be giving their drumming sound somewhere off in the woods, but where it is you cannot easily detect, nor can you guess with reasonable accuracy how far away it is, if you can locate the general direction. Red-shouldered hawks may be heard off over the tree-tops calling their rather musical "kee-yu, kee-yu" while circling high in the air. There is plenty of reason why they should circle high, since the average farmer will shoot them on sight irrespective of the fact that they are splendid mouse-destroyers. And so as far as birds are concerned, April marks the beginning of the really big migration to the north, also the actual beginning on a good-sized scale of home-building and young rearing.

While these things are going on with the birds, you may see the enormously plump queen bumblebees hunting around for a crevice into which they may crawl and start producing their young for the year. On them rests the responsibility of many bumblebees' lives and of the successful pollination of many plants whose flowers will depend upon these bumblebees for pollination. Queen wasps may be seen seeking nesting sites, and from this you may see that home-seeking in April is not limited to the human species nor to birds. If you take the time to watch a queen bumblebee examining possible apartments you will realize that she is not easy to please and one is tempted to wonder whether it is the wall-paper, the plumbing, or the condition of the floors that decides her to abandon seemingly acceptable places, for those which may seem to us inferior. They don't need to worry about the rent since they pay none, but the neighbors might make a difference, though probably they are not taken into consideration at all. In fact, there are neighbors who would probably object to the bumblebees taking up their quarters too near. In April, the lady-beetles begin to appear in our houses where they have crawled out of their winter homes in the cracks. The lady-beetles do not establish summer homes, but apparently lay their eggs wherever there seems a possibility of the young having something like plant lice to eat. This may not be, and probably is not, intentional, since the adults may be near the lice for the purpose of eating a few themselves. April also is the month when the little early azure butterflies begin to wing their way through the woods. They are most unique in that the succeeding generations are not alike. At least a first generation butterfly differs from those of the second, though the first will be duplicated in a later generation.

In the warmer parts of the country the trees will have developed full-sized leaves by the end of the month, while in the cooler parts they may be barely started. In the swamps in the east, the green-stemmed spice bushes may become conspicuous with their diminutive flowers. In the town the forsythia shrubs may begin to show their golden bell-like flowers and by the end of the month be at their best. Crocuses and hyacinths and tulips may make good progress in April or reach their best development in April depending, of course, upon the part of country in which we are. In the far west, the hillsides may show us interesting clusters of baby-blue-eyes while in the east somewhat similar situations may, by the end of the month, show patches of innocents or bluets. Each is well named as those who have seen them will agree. In the midwest, the pasque-flowers give a touch of the same color to the landscape though the flowers themselves are, of course, much larger than either the bluets or baby-blue-eyes. Yellow adders' tongues in the east, and white adders' tongues in the mid-west, may be found in April, though their relatives in the woods of the west coast near the sea have long since gone to seed, their blotched leaves much larger than those of the east, being very conspicuous.

Snakes will have become active in most parts of the country by the end of April and frogs' eggs or the tadpoles which may have developed from them will be found in most ponds. Among the diminutive tadpoles of the year may be seen the rather husky tadpoles of those species like the bullfrog and green frog that require over a year to go through the tadpole development. Tree toads and wood frogs may be heard with the chorus of peepers in April. Neither April nor the calls of these frogs seem to be able to awaken the hibernating bullfrogs.

MAY

May is the month in which parental care in nature comes to the fore. The birds are feeding their nestlings or attempting to lead intruders away by all sorts of exhibitions of distress, from broken wings to a dragging leg and parental care of many sorts is being exhibited by mammals, fish, and even insects and crustacea. Whether or not, what appears to be parental is always exactly that, is of course a debatable question, but it is true that many young receive care and protection from their elders, whether their elders do it from choice, for selfish reasons, or just by accident. May is a good month to find out a few things of this sort for one's self.

Of course the great host of migrating birds are most active during May. Not only are they active physically, but vocally as well. This section of the almanac is being written in May and during the day twenty-one species of birds have been heard by the writer above the rattle of the typewriter. So "whether we look or whether we listen," May nature study forces itself upon us as emphatically as it does in any other month. One admires the great concern shown by the robins for their young when a cat gets near, or when the screech-owl that hangs around the vicinity comes out in the early evening. The bustling vigor of the wrens that have stuffed every nesting box on the place might be considered admirable, even though the reputation for wrens in the line of bigamy is hardly enviable. We can forgive the wrens this diversion, however, when we consider it in contrast to the total irresponsibility of the cowbirds that lay their eggs in other birds' nests and show no parental care whatever. The rather promiscuous mating habits of cowbirds which are conspicuous in early May are in keeping with the manner in which they hand their young over for others to bring up later in the month.

In May, young half-grown cottontails may begin to make their appearance along the roadsides. By this time, they have begun to shift for themselves in many cases. Deer have given or are giving birth to their fawns during May and for some reason or other seem to lose the scent, which at other times of the year assists their enemies in finding them. Young black bear cubs have developed almost to the "teddy bear" stage of cuteness. They will stay with their mothers at least until fall. But bears or any other creatures do not have a monopoly on interesting young. In the prairie region, the gopher holes may be the retreat not only of the adult animated tent-pins, but of a small horde of little pegs that frequently seem to act almost in unison at the signal of alarm, the result being traffic congestion at the burrow entrance.

While mammals are caring for their young on dry land in May, an old stump or bunch of refuse at the bottom of some lake may be the home of a mother cat-fish who is more attentive to her young than many of the mammals and birds. After the eggs are laid and fertilized, she stays by them and protects them until they have hatched and developed into little cat-fish, an inch or more long. Not only does she protect the eggs from marauders who might eat them but also from the equally dangerous sediment which might suffocate them. This latter act of protection is performed by fanning the eggs with her fins, or assisting by even taking them in her mouth and letting them settle free of the sediment which may have collected.

We might say that toads were in their element in May but this would hardly be true since they spend most of their lives away from the water that attracts them for breeding purposes in May. Toads as you may know lay their eggs in long strings which may quickly become sediment covered and consequently inconspicuous. Tree toads may be heard calling in May.

It is in May that our tent caterpillars become most conspicuous. Their tents appear in the crotches of the cherry and apple trees, the limbs of which have been stripped of leaves. At certain times they may come out on the tops of the nests and lie in a closely packed mass seemingly enjoying a sun-bath. The same trees that bear the tent caterpillars may have their leaves generously peppered with the newly formed galls of the gall mite *Eriophyes padi.* Apple and cherry trees may not be attractive in May because of the tent caterpillars, but they certainly are attractive because of their flowers, and few sights in nature can equal a Baltimore oriole actively engaged in feeding around a wide open bunch of apple blossoms.

Apple blossoms, of course, are not the only attractive flowers to be found on woody plants in May. The pink azaleas or pinxter flowers are in their glory by the end of May, and the magnolias have been at their best much earlier in the month. But the most conspicuous thing about woody plants in May lies, not in the presence of their flowers, but the remarkable change that comes with the full and rather rapid development of their leaves. With the advent of the shade made by these leaves a considerable change comes with the plants of the forest floor. The showy flowers of the early part of the month generally give way to those less showy and such flowers as solomon's seal and its imitator the false solomon's seal come into some prominence. Meantime one may find a few morels, those delicious edible fungi that could never be mistaken for the poisonous gill fungi. Few of the gill fungi that are so abundant in the summer and fall months are to be seen in May.

JUNE

No one would think of saying of June that it was a month of privation. In fact, it might almost be the opposite. To be sure, in some parts of the country, the hills have begun to dry up and assume the brownness which they will wear until the winter rains but in other parts of the country every day finds the early worm competed for by a new family of young spotted-breasted robins. New hordes of insects compete with one another for the best feeding ground on their favorite food plants and new crops of black-flies and mosquitoes compete with one another for a feeding place on those humans brave enough, or foolish enough, to go where such competition exists. Obviously such a condition as this cannot exist forever and where many have been called to begin living more or less independent lives in June, comparatively few will be chosen to survive the attacks of enemies and the competition of kin. It is necessary that such conditions as these exist temporarily, that there be an overproduction, for without such a system most forms of life would have to make a living out of thin air, or eliminate the other forms of life eventually. The independence of youth, free from parental care, accounts for many an easy meal for the natural enemies of those animals endowed with youth. And so we may go through June with reasonable expectation of seeing an increasing number of young crows, young robins and young birds of many sorts, as the new broods appear, and a decreasing number thereafter.

It is interesting to notice in June how some species of young birds look very much like the adults as soon as they are full-grown and how many other young birds differ very greatly from their parents. It is easy enough, for example, to tell a young robin from an adult, but not so easy to distinguish between a young crow and an old one.

There may be a few species of birds which continue what seem to be their courting antics through into June. Mocking birds for example seem to be as crazy as ever. When one has the opportunity to watch mocking birds, even after the young are partly grown, one realizes that possibly the apparent craziness is a more or less natural state of affairs and not necessarily one induced by the desire to show off to a mate. It is admitted that this may be a dangerous generalization.

Not a few birds will set about rearing a second brood almost immediately after the first has begun to shift for itself.

June is the month when the bullfrogs and green frogs begin their calling, generally from bigger ponds than those which were favored by the earlier peepers. In the mid west the smaller ponds will be noisy with the cricket frog that can call while only a few feet away and deceive one both as to distance, and definite direction. One wonders if those to whom they are calling can use their sense of hearing no better than we. Cricket frogs make a noise that sounds, possibly, like hitting two large rocks together with increasing violence and rapidity.

Snakes are foraging in their chosen environment in June, some species confining their activities to waterways, some to meadowlands, some to trees and shrubs and some to the leaf-covered ground of the forest.

Not a few of the fields through which garter snakes may roam will appear most beautiful to those not concerned with economic products of the land. Yellow patches of mustard appeal to an artist but hardly to a farmer. Daisy fields are beautiful and make pretty daisy chains but unsatisfactory hay. The devil's paintbrushes introduced as garden plants to ornament a flower bed are not a desirable ornament to a field that could produce something more useful to man or his domestic animals.

While we are talking about over-production of birds and over-production of weeds we must not forget the over-production which may be taking place among the insects in June. The lights of our river towns may be clouded with great hordes of may-flies, those creatures that live as adults but a day or two and yet their number does not seem to diminish for a considerable period. With them about the lights may be those smoky-winged adult caddis-flies, which also came from the water and now seem unable to resist the temptation of a light. The bright spots or the great white ways made by lights at night are not, however, limited to insects that come from the water. Hordes of moths of all sizes crowd about, butting their foolish heads against the glass which protects them from the light that would kill them could they reach it. Some of these moths may be those of our large native silk worms, the cecropias, lunas and prometheas. With the prometheas, however, we find that it is the females that are nocturnal while the males fly about by day. Pick a few promethea cocoons from your lilac bushes. Let the moths emerge between a window and its screen. You may see many male moths visiting the window during a day.

Not infrequently the lights which attract these innumerable insects also attract the bats that feed upon them. Possibly you may have the good fortune in June to see a mother bat flying about with her young still clinging to her. With the advent of great numbers of insects there are fortunately many hungry mouths into which they may go and so June is one in which nature begins to strike a balance. The numbers of insects must continue to increase through the summer, but by June the maximum number of mammals or birds for the year will probably have been reached, even though many of these may still be far from independent.

JULY

July is a month in which many forms of life begin to finish up the work started earlier in the spring or summer so that when August comes a vacation may be in order. A very large number of the birds will, during the month, have established their young on a basis where they may assume their own responsibility so far as the getting of food is concerned. This, of course, lessens the burden on the adults over what it may have been when the young were growing and entirely dependent. It is little wonder that with the work that has to be done, most of the birds will do less singing during July than they did during May and June. Those that have reared but one brood may begin to extend their range of feeding beyond the limits established by convenience to the nest. Whole families of sparrows and of blackbirds may be seen feeding or going to roost together. As the month advances families may unite into small flocks, and these flocks into larger flocks, which may be conspicuous not only by size but the abundance of calls which of course in no way compare with the songs of earlier in the season.

Goldfinches may be seen collecting the unmatured thistle seeds to serve as food for their young. Unlike most birds, goldfinches feed their young from the beginning upon plant food. Most birds, even though they may eat plant food as adults, feed largely upon insects as young. The marshes which serve as the breeding grounds for enormous numbers of water birds and shore birds, in July will be intensely interesting as a training ground for the young of these birds. In early July in the Bear River Bay region of Great Salt Lake, the marshes will be alive with stilts that act as though they were insane, great dignified and sober pelicans, absurd and gawky young herons that try to drive you away by regurgitating fish at you and then you will turn to see little families of cinnamon teal that make you want to take them home and care for them.

While you are wading around in these, or any marshes, in July you may notice the fine dust-like pollen of the sedges that so readily beclouds the lens of the camera you may have along to record what you see.

Among the sedges from coast to coast may be found various kinds of sticklebacks, diminutive fishes, the males of which build nests and then care for the young which develop from the eggs the females deposit in the nests. Not only the sticklebacks that live among the weeds have unique life histories, however. Some of the killifish or top-minnows that live in the rain pools of the various parts of the country give birth to living young instead of laying eggs like most fishes. Both the sticklebacks and the killifish are highly useful in keeping down the number of mosquitoes a given area of water may produce.

It is in July that we frequently find the ground apparently well covered with very small toads or very small frogs. These have transformed from the tadpole stage and are beginning to make their living on land. In some species it may be a number of years before the individuals become sufficiently mature to produce eggs. In the same month the newt larvæ may come out onto land and change into the little pink efts that are so easily killed by drying out. These will probably continue living on the land for something like fifteen months before they again change and go back to the water as adults. During that time they, of course, increase considerably in size. They are most active when the atmosphere is moist and the sunlight not intense.

If it were not for the newts and the frogs and the birds the number of insects that would thrive through July would be so great that none of our crops could thrive. These frogs and toads, however, do not have a carefree life for they make splendid meals for many kinds of snakes. This should not be taken to mean that because certain snakes kill useful frogs all snakes should be killed. Many snakes are splendid rodent destroyers, and not a few eliminate a goodly number of insects that might otherwise be destroying our crops. A few snakes, particularly those of the egg-laying type, may start a new generation in July. Fence lizards, too, may be seen to lay their eggs if you have them confined in reasonably comfortable terraria.

In July, the milkweeds may be well supplied with the caterpillars and even the pupæ of the monarch butterflies. Not long after, the ragged travel-worn adult monarchs that have winged their way from the south where they wintered, may be replaced by the fresher more beautiful insects of the year. You may enjoy examining the gold-spotted green chrysalids and wondering where, if anywhere else in nature, you can find so golden a color.

While the milkweeds are being populated with monarch caterpillars, the green lace-wing flies with their golden eyes, may be seen fluttering about over a variety of plants. If you are fortunate, you may see the mother lace-wing as she places her eggs on the end of tall filaments so that the hatching young will not promptly eat up their still helpless brothers and sisters.

While these things are going on among the insects, the mammals of the wild may be devoting their energies to increasing their bodily stature as much as possible. Food is reasonably abundant and shelter is equally available, so life to mammals is not the problem it may be in many months other than July.

AUGUST

The fact that birds have practically ceased to do any great amount of singing by August does not mean that all nature is silent in that month. With August the insect choruses begin to come into their own, while the birds retire backstage to change to a new suit of feathers. Probably the fact that birds do moult during the month is largely responsible for the rather unusual quiet which they observe. As the month wears on, one may hear great-crested flycatchers and vireos and wood peewees, with now and then an oriole or goldfinch but aside from these the songsters generally seem to have gone on their summer vacation. Some of the birds may even start moving south during August, though a few vary the order and take short trips north before starting south. This habit assists a bit in making bird lists continue to grow even at this time of year. At any rate those birds that tend to migrate in flocks will have begun to gather together by the end of the month. It has been suggested that these flock gatherings, which not infrequently involve increasingly greater daily journeys, serve as preliminary training for the trip south. Strangely enough the journey south can hardly be considered an expedition to be planned and lead by the adults since in many, many cases the young birds of the year precede their elders. Strangely enough, the young follow the same general paths which their elders may have followed before them.

Ever since late June the cicadas may have been heard giving their monotonous high-pitched song from the tree-tops. This they continue, on even into September, but August is the month when the grasshoppers and snowy tree-crickets come into their own. The grasshoppers, of course observe no unison, in marked contrast to the performance of tree-crickets. Unlike very many insects there is no great number of generations of grasshoppers and cicadas and snowy tree-crickets produced in a year. The creatures generally begin their "songs" about as soon as they develop to an adult condition. In the cicadas this takes years. In the grasshoppers it is done at least within the year. During late August you may not infrequently surprise a female grasshopper with the tip of her abdomen sunken into the ground where she is placing her eggs for the succeeding generation. In some species the young from these eggs hatch and develop to fairly good size during the fall months. This necessitates their wintering in an immature stage, but such a state of affairs is hardly the rule. Farmers not infrequently time their fall plowing so as to destroy a maximum of insects as well as to get the soil in condition for the purpose for which it is to be used. Generally they can't plow deeply enough to reach the cicadas and could not do so easily, since these creatures spend the early stages of their lives deep in the ground getting their nourishment primarily from the roots of trees.

August is the month when those snakes that give birth to living young begin to do so, with the result that there are many diminutive snakes about over the ground. Most of these begin immediately to secure their own food. Sometimes this food is other small snakes, as was the case I noticed last August when a young milk snake tried to swallow a young garter snake nearly its size. As I remember it, the two of them together would not total a foot in length. The fact that many snakes give birth to living young, may have given rise to the supposition that mother snakes swallow their young for protection. It is true that many a snake has been crushed and found to contain a large number of young but this does not prove, of course, that they have been swallowed at all.

The trees of August will show that in many cases at least the buds for next year have already been formed at the base of the leaves of the year. Not a few trees will begin to shed their leaves in August even though they may have been shedding a few almost constantly since they first became developed. Among these fallen leaves you may detect, no doubt, a considerable number of tree seedlings most of which will be unable to prosper because of the competition of their fellows and because of the shade cast by their immediate ancestors. This, of course, refers to the shade of their ancestors, not the shades or spooks of their ancestors.

In the more open fields golden-rod and chicory and queen-anne's lace or wild carrot will begin to take the place of the daisy and paint-brush and mustard. If you have never done so, examine a cluster of flowers of wild carrot and notice the single dark flower which is usually to be found at the center. Notice, too, how wild carrots' heads open and close under different weather conditions. Not infrequently, when closed, they resemble bird's nests. In the middle west the fields will begin to show the prairie flora at its best. Great yellow wild sunflowers and the reddish blazing-star will be mingled with the teasel-like "nigger-heads," or purple cone-flower, closely related to the smaller black-eyed susan so common to the east. Then, too, the leaves of the compass-plant or rosin weed always increase our wonder at the great variety of interesting things to be found in nature. If we desert these drier lands and go to the waterways we may find that in August pond-weeds may be sticking their flowers above the water and duck-weeds may be floating so closely on the surface of the lagoons that we can see nothing in the water beneath them. Surely a pond in August holds a sufficient variety of living things to suit all.

SEPTEMBER

With the coming of September many forms of life become concerned, not so much with the production and protection of offspring as with preparation for their own protection through the difficult winter season which is ahead. The laying on of fat, or the laying away of a reserve food supply, seems to be the order of the day or with some species, of the night. Not a few species, like the "striped gophers" of the mid-west prairies, will retire to their burrows for the winter season. While their food has been largely insects and other small forms of animal life during the summer they have stored under ground a supply of plant food which will not so easily spoil and which will be useful when it may be needed later. The national parks in the high mountains will be closing their doors to tourists, because the snows that fall on the peaks will begin to stay on a little farther down the mountain sides than usual and by the end of September almost anything might happen. Some of these resorts will have been free of snow only in August, and some will not have had even that freedom. Even though the wild animals cannot read in the newspapers that snow has fallen in the Adirondacks in late September, they seem to be able to sense the coming winter and prepare for it.

There is little reason to suspect that wild life reads and interprets the change in the color of leaves as a sign of winter but there are signs which we have learned to look upon as indicative of the end of summer. See how many you can select. The rather unusual abundance of fruits like grapes and apples and of nuts of all kinds may mean, to some of us, that winter is approaching. To those creatures like the squirrels, that store food, this superabundance is more than welcome, and to those that prepare for winter's hardships by putting on fat, it is equally so.

In the early days before we had fences, the advent of fall was marked by the southward migration of great herds of grazing animals. At the same time a considerable number of birds began flying to the south along with certain of the bats that have the habit of flying south rather than of spending the winter in hibernation. To be sure the migration is not at its height by early September, but as the month advances the general tendency for those creatures that move south will be increased in the direction of their doing so.

Muskrats will probably have completed the thatching of their winter houses. When the thatch has been cemented by ice the creatures feel secure from the attacks of many of their much more powerful enemies and, since the entrance of the winter house is under water below the usual ice line, the muskrats may be as safe in the winter as they are at any time of the year.

Of course winter has not arrived in most parts of the country in September. In fact many parts will be suffering with the most intense heat, even though some of those who complain the loudest may continue to wear furs around their necks for the sake of style. Generally speaking, one might say that September is an ideal month for a vacation. The days are more likely to be clear, the woods are free from hordes of annoying insects, the nights are cool, and everything is ideal for comfortable camping. Of course, there is the danger of being shot for a deer or being burned by a forest fire set by some careless camper but this condition hardly prevails in the early part of the month, if it happens to do so in the latter part. Possibly the mosquitoes and black flies of the earlier season could help the woodlands now by eliminating some of the pseudo-roughing it parties of September.

So far as the voices of nature in September are concerned, one will have to admit that the insects rule the orchestra. Most of these are members of the order to which crickets and grasshoppers belong and they seem to apportion the twenty-four hours of the day so that some of them may be heard at almost any time. By the end of the month they will become stilled to a considerable extent, but at the beginning, all instruments are going full blast. One should not assume from the above that all members of the grasshopper-cricket-katydid clan are noisy. There happens to be at least one member, the praying mantis, that is distinctly silent and unusually interesting. If you have never had the opportunity of watching a mantis twist its head around to look the world over you have a good grin coming to you when you do. If the unconcerned gazing is during a pause in the meal the creature is making of some other insect which possibly might have been a potential husband of the feaster, your interest may be aroused even further. Surely with the male mantis, as with many male spiders, it takes a brave heart to win a fair lady. If the candidate does not satisfy the fair one from the standpoint of being a mate, he may satisfy her from the standpoint of being a good meal and this decision on her part may be reached at almost any time, during or after the courtship.

One cannot leave September without comment on the fact that the leaves of many trees are beginning to show a change in color, or that the golden-rods and asters are beginning to rule the roadsides where in earlier weeks the sunflowers reigned supreme. The fungi, both those that are edible and those that are poisonous, as well as those that are neither, become a little more prominent than they have been. Some of the ferns are in their prime, though the sensitive ferns readily show the first frost by drying up and dying.

OCTOBER

Most of the migrations which started in September will be still under way in October and many of the birds that have delayed migration will now begin. Rumors of snow in the higher parts of the continent come in with increasing frequency and by the end of the month many parts of the country will see snow, in reality, even though its presence is still considered somewhat unusual.

Possibly one of the most conspicuous things about October is color. This is, of course, most evident in the leaves of woody plants in certain parts of the country but there are many plants whose fruits form masses of color that appear to be attractive to migrating birds as food counters. October is the month when you may watch a grey north sky produce robin after robin, after you have been accustomed to seeing robins come to you over the lawns. It is intensely interesting to watch how the migrating birds seem to come out of nothing but air. If you do not happen to be located at a place where they stop to rest you may see them vanish in the other direction almost as mysteriously as they appeared. It seems almost like lying at the bottom of a stream while above us pass creatures capable of navigating an element in a manner denied to us.

One would think that the fact, that the trees have shed their leaves, would cause all the wild life of the woods to become conspicuous. This might be so, but for the fact that the creatures themselves are so colored that they are inconspicuous. Some may remain absolutely exposed to their enemies and yet be inconspicuous. This protection is secured, both by resembling the environment in which the creatures live, and by bizarre markings which may be conspicuous, but deceive the observers into believing that the thing seen is something other than what it really is. This sometimes is as good a mode of protection as any.

Protective coloration and mimicry and deceit are not limited to mammals or birds. Many an insect resembles a piece of twig or bark. Many others appear to have great staring eyes hideous enough to scare or at least startle one. The great caterpillars that produce the tiger swallow-tail butterflies are among these. If hideous coloration is not sufficient, many will be found to give violent swishings of their body suggestive of ability to do damage. Some puff up their bodies and some erect startling looking "horns." The larvae of still other insects couple with ideal protective coloration the ability to expel unpleasant liquids at their enemies. Among these are the larvae of certain saw-flies that may be found occasionally on willows and other plants as late as early October. While these insects are going quietly about their business, the crickets, cicadas and katydids may be continuing their racket in their chosen sections of the environment. The month of October will probably still most of these, however, the safety of the perpetuation of many of their species resting in the eggs which have been laid, or in the young which may have hatched from the eggs in late fall. A few may winter as adults, but these are the exception, rather than the rule.

In the mountains of the far west we still see a little touch of the green which will begin to appear with the winter rainy season. One wonders how any creature can make a living from such an environment. A little trip to the places where water is still available, shows most spectacularly what a difference the absence or presence of that most valuable part of nature makes to all living things. What a difference there would be in a world without water or atmosphere!

Spectacular coloration in October is not limited to woody plants, however. The asters and golden-rods that began to come into their own in September are now probably at their best. The woodlands of the east and middle west may still show the clustered heads of white snake-root that have been more or less conspicuous since late summer and the Joe-Pye weed may still add a touch of color in the swamps and thickets. As October advances these lose their freshness, if it has not already gone with the beginning of the month.

While it is possible for birds to migrate by flying, fish to migrate by swimming, and mammals to migrate by running, it need not be considered that plants may not send their offspring also to distant lands. Milkweed pods and dogbane pods will be splitting and freeing the seeds that have been provided with parachutes. Like the young spiders, they then sail off to whatever lands the winds may take them. The cockleburs, Spanish needles, sand-burs and stick-tights of all kinds know how to make use of passing animals to assist these plants to inherit the earth. One might speak of these plants as being the meek that are to inherit the earth, were it not for certain unpleasant experiences with sand-burs and bare feet. Surely October is a splendid month to study the manner in which plants may have spread over the earth. The waters in the swamps are supplied with the fruits of sedges and docks, which are provided with life-preservers to carry them far away. The winds carry the cat-tail fluff long distances to drier grounds, where it may be useless, but the same wind may there pick up other seeds and carry them on. Meantime a few birds may stop during their southern journey to eat a few seeds, that may survive the attacks of the bird's digestive tract, and live to grow in other lands. Not a few like the witch-hazel spread their seeds by more or less violent explosive means.

NOVEMBER

The uncertainties which marked the months of September and October will for the most part, be banished in November. Winter is coming and there is going to be no way of avoiding it. That is, there may be ways of surviving it, but few if any may now avoid it as have those that have gone off to the south. The southern migration will still be on, so far as many of those birds which were the first to arrive last spring are concerned, but of the great host, the majority will have betaken themselves "down south." Some animals which are unable to travel great distances still are able to go "down" in the most literal sense. If the frogs and turtles and snakes have not already dug in for the winter by the beginning of November, they will do so now or pay the penalty of death. This general exodus of a very large proportion of our animal life in the north naturally floods the south with animal life, and unfortunately with gunners as well, though this exodus may be a bit more appropriate later in the year. Those creatures that are left are particularly worthy of study from the standpoint of understanding how they are able to continue to thrive where others would fail.

There are a number of ways that animals, in the broad sense, use to maintain existence in spite of odds, and they might well be studied in November. The ability of certain animals to vary their diet to fit whatever may be available is a distinct asset to some species of birds like the grouse. The possession of unique bills that are able to secure otherwise inaccessible food supplies makes it possible for cross-bills to make a living where others might starve and we might elaborate this thought with mention of many species. But the ability to get food alone is not always a deciding factor. Unless the creature can also prevent himself from becoming food, his luck will be against him. Of course experienced animal eaters would hesitate before attempting to make a meal of a porcupine or a skunk, but seemingly unfair weapons such as these creatures have, are not always available. In emergencies of this sort we find no little value attached to the development of certain skills such as climbing trees readily or jumping from tree to tree or digging into the ground more rapidly than is possible by the pursuer. To these might be added superior ability in actual combat, which may not infrequently be of value as a deterrent to a prospective enemy. Ability in combat may be used not only for personal protection, but for the purpose of winning desired mates as is exemplified by the combats between buck deer and their kin during November. The spoils are not always to the aggressor, however, as many a bull moose has found to his sorrow. Besides these modes of defense we find many forms of life that seem to rely on sheer force of numbers to carry them through. Mice make up the food of a large number of flesh-eaters when larger game is not available, and yet mice are hardly serious fighters, nor are they particularly clever in hiding their trails. Even humans with untrained eyes, and noses incapable of being trained, can follow a mouse-trail through the grass if they have the least desire to do so. You need not think back far to remember the mosquito days. If you do, you will remember that though you swatted them right and left still they managed to continue to exist to your great discomfort.

Most of the trees that shed their leaves will have done so by late November, if they haven't done so earlier. Have you noticed how such trees as the beeches, some maples and not a few of the oaks tend to retain a considerable number of leaves often clear through the winter? Examine some of the twigs from which trees have recently shed their leaves and see how quickly and perfectly the wound or scar has been healed. Notice how on the sycamores the base of the leaf-stalk completely covered the bud while in most other woody plants this is not so. If you hunt for the buds on syringa and black locust at this time of year you may not be able to find them. It might be interesting to "keep tabs" on them and see when and where the buds appear.

In spite of the fact that winter is close at hand a surprising number of wild-flowers and weeds may be found in flower, clear through November. They are not to be found in the profusion of earlier seasons, of course, but a quite presentable bouquet may be made with little difficulty. If the wild forget-me-nots have not been completely destroyed by the first of November, notice how they change from their famed blue to pink.

Most of the amphibians and reptiles will have retired for the winter by November. You may find a sluggish snake now and then, but as a rule this will not be the case.

In the brooks, trout may be building their nests and laying their eggs. This is not true of all trout, of course, since the rainbow trout usually breed in the spring, and the eastern brook trout breed in late fall. If you have a chance to visit a state fish hatchery, it may be particularly worth your while in November, as the earlier stages of development somehow seem to be the most appealing. It is fortunate for hatching equipment, that not all species of game fish breed at the same time. Pike and pickerel will breed later in the season.

Newts may go through their breeding antics in the late fall, and it is during these months that you may have the opportunity of watching the red land form take on the color and shape of the adult form that lives in the water.

DECEMBER

It may be safe to say, that "it was the night before Christmas and all through the house not a creature was stirring, not even a mouse," but that would hardly hold true outside the house. Rabbits, foxes, shrews and even the mice, that were supposed to be quiet in the house, may be active all winter outside. There are some of nature's children who may be tucked all snugly in their beds while visions of all sorts go through their heads, but many animals can't keep their stomachs satisfied by visions in their heads. If we count the inactive insects, it is possible that the numbers of active and inactive animals are more nearly equal than one might at first suppose. The life of ponds and streams shows little interruption, comparatively speaking, even though they might be easily considered as tucked away in beds under white coverlets. Crayfish may even be mating at this time of year at the bottom of ponds under the ice. A few months later the females may be seen with eggs beneath their bodies.

The birds, that are present in the northern part of the country in December, are those fitted for the rigors of winter. To them is forbidden the privilege of hibernation or even semi-hibernation enjoyed by certain members of the groups to which fish, mammals, reptiles, amphibians and insects belong. It is possible that their superior means of travel may have been a factor which makes hibernation unneccessary. There is a great deal of difference between the December weather of our northern border and that of our southern border and the trip is not difficult when you have wings and nothing else to do. Of course, the birds to the north of wherever we may be here in the United States come down to spend the winter with us and that gives us a new bunch of friends with which to get acquainted. If we haven't seen to it that feeding stations have been provided for our winter friends before December, then now is the time to do it. It may be easily demonstrated that birds show a preference for certain foods, and in a handful of mixed grains will always be found those which are eaten first in the place of less desirable kinds.

While we are on the subject of seeds and grains we might again call your attention to how splendidly the pigweeds serve as winter lunch counters. It will surprise you to find how many other, apparently dead and useless, weed tops really are well supplied with seeds and fruits, which may save many a bird from starvation. Were it not for these weeds our winters might easily be devoid of juncos, tree sparrows, song sparrows and red-polls. Without them, winter would be much less attractive. They and the titmice, chickadees and nuthatches keep us from forgetting the time when birds were all about us.

Christmas without Christmas greens does not seem to be Christmas, but if we continue the destruction of native greens as we have in some places, we will be forced to go without them. It seems queer that people should worry for fear that they will not have a white Christmas and then do their best to decorate their houses with green and red. This need not be taken as a criticism of the use of Christmas trees, because we have solved that problem in connection with forestry and the trees may be raised as a profitable crop in connection with reforestation projects. It will be necessary, if the demand for other greens persists, to do something to insure continued production, just as we have done with the Christmas trees. The stealing of greens for Christmas decoration is, of course, entirely contrary to the spirit of Christmas. Santa Claus dosen't like a stolen Christmas tree. While looking over the Christmas trees which you may purchase, notice how the stiff sharp needles of spruce make you "spruce up" and how the blunt needles and smooth twigs of the firs feel soft like fur, which of course, is spelled very differently. Hemlocks and red cedars, of course, look and feel differently from either of these. While you are looking these Christmas trees over, it might be well to determine approximately how old the tree was before it was cut. The whorls of branches sent out each year by spruces and firs make a determination of this sort a simple matter with them.

The month in which Christmas comes may, of course, be appropriately associated with star study. The legends associated with stars are worth knowing, though, of course, if any modern people tried to offer them with any expectation that they would be believed literally it would be surprising. Orion, Taurus, and the Pleiades are interesting constellations for December study aside from the polar constellations that are to be seen throughout the year. The old family almanac with its signs of the zodiac, supposedly of use in predicting weather, disease, catastrophe and good luck, are now taken with a grain of salt generally. In their place people know more of the truth of other worlds, and of this one; of other people, and of themselves. These truths are not arrived at by the methods of the astrologers, and therein lies a great difference which may help explain the progress that has been made in the realm of science in modern times. We shall never know all that is to be known, but our experience is enabling us, to some degree at least, to place reliance on the methods of the scientist. Much has been contributed to our modern methods in science by those who evolved their methods from the study of stars. Much will still be learned from them.

ASSOCIATIONS AND CLUBS INTERESTED IN THE PROMOTION OF NATURE EDUCATION

E. Laurence Palmer

Creation of public sentiment in support of nature education has been largely a question of leadership. In the progress to the point that this country has now reached, this work has been furthered by many leading associations and societies of scientists and laymen, actuated by an appreciation of the vital need.

There are hundreds of more or less well organized local groups in addition to the several national groups here considered. Some of these are of long standing, while others are decidedly ephemeral. As in society in general, the effectiveness of any particular group has varied from time to time with the result that new groups have arisen here and there each with the avowed purpose of doing more effectively a more or less particular piece of work which it was thought was not being satisfactorily developed by existing groups. In general, one may say, and with considerable satisfaction, that nature organizations have rarely been formed for the purpose of the personal aggrandizement of the founders. It would hardly be safe to say that this is always absolutely true. Examination of the historical records of some of the organizations indicates that occasionally groups have been formed in protest against certain leadership which may have well established itself in existing organizations. When one looks at these matters in a broad way, however, one is inclined to feel encouraged rather than discouraged at the situation since progress will be made through free discussion and investigation and this is possible under the present conditions.

One decidedly encouraging tendency which has developed in the last five or six years is represented by the formation of groups or committees representing groups whose purpose it is to coordinate and integrate the activities of the more specialized units. The fact that leadership for many of the groups is often essentially the same has tended to rationalize the activities of all groups where this would not be possible under other circumstances. The formation of strong special groups has occasionally weakened the service of some of the older established units. But in general such development has been recognized as creating a situation permitting the older group to direct its energies where it would otherwise have been impossible to do so.

It is perfectly natural to expect to find that the older groups usually recognized more general obligations than the more recent groups or that they used more varied means for developing their programs. In a sense, these older organizations have served their purpose in creating a situation in which the newer units can do effective work. In general, it would seem that there has been a mutual recognition of the merits of the work done by the older and newer units though this has not always been the case.

One cannot arbitrarily classify the activities of all the organizations which have identified themselves with nature education since many have highly generalized, purported functions. The classification here given has some basis of reason and should be more helpful than a presentation of the organizations on either a chronological or alphabetical basis. If critics resent certain of the classifications here given, apology is made at this time and corrections are sought.

The statements which follow this introduction have either been prepared by officers of the organizations or have been approved by them. Omissions which may occur are due either to failure of officers to supply data or to the fact that information was not otherwise made available. There are a few organizations whose activities were reported in *The Nature Almanac* of 1927 which are not represented in the present edition. In a few cases, this is due to the fact that it was not apparent that the organizations were concerned with nature education in anything but a secondary manner. In other cases, it was felt that the influence of the organization was more local than national in significance. A number of new organizations appear in the present account either because of significant contributions to nature education or for the purpose of helping the reader understand the manner in which the activities of the various groups are integrated.

At first hand one is greatly confused by such similar organization names as The American Nature Association and the American

Nature Study Society, The National Parks Service and the National Parks Association, The Campfire Club of America and Camp Fire Girls, The Playground and Recreation Association of America and The National Conference on Outdoor Recreation. There seem to be " national associations " and "American societies " and " councils " and " leagues " galore. Possibly there are too many of these but this is doubtful when it is recognized that these organizations serve such remotely associated functions as concern work with juveniles and with profound scientists, with politicians and educational philosophers, with those who wish to kill forms of nature and with those who are opposed to this practice, with those who think of conservation in the terms of animal husbandry and with those whose motives are less selfish, with those who see the present more important than the future and with those who would reverse this order. There are groups whose chief interests are with " the flowers of the field." Others are more interested in the insects that visit these flowers. Still others think of nature primarily in terms of the birds that may eat the insects and so the specialization continues throughout most of the systematic field.

Possibly the organization here represented as being concerned for the longest time primarily with nature education is The Agassiz Association. The late E. E. Slosson stated that he was one who owed the organization " a great debt of gratitude " for steering him " into a scientific course of life at the formative age." If the Association had done no more than influence Slosson it would have justified its existence but there are many others who consciously or otherwise also owe the organization their debt. Some years later a more closely knit organization known as The American Nature Study Society sprang up under the inspiration of M. A. Bigelow of Columbia University. This organization assumed the responsibilities of popular publication now carried more effectively by The American Nature Association. It also assumed leadership in the field of supervision of nature or science work now the special responsibility of The National Council of Supervisors of Elementary Science. It was the only national organization then interested in the research work now sponsored to a degree by the National Association for Research in Science Teaching. It helped guide those interested primarily in work with juveniles who later formed organizations of their own such as Boy Scouts, Girl Scouts, Camp Fire Girls. It was closely associated with the American Association for the Advancement of Science, its members for the most part being also members of one or more of the pure science branches of that association. Later it recognized the value of cooperation with the National Education Association and became semi-officially affiliated with the Department of Science Instruction of that Association.

Concurrent with the development of these organizations there appeared a great number of more or less powerful organizations interested in specific systematic fields. In this category we have The National Association of Audubon Societies, The Entomological Society of America, the American Society of Mammalogists, the American Ornithologists Union and others, among which might be listed The American Tree Association and such. Occasionally societies have been so closely affiliated with some periodical that it has been difficult to consider membership as being professionally significant though this cannot be taken as a severe criticism since in practically all cases the magazine and its subscribers have been instrumental in supporting considerable valuable research and in assuming certain civic responsibilities which might otherwise be neglected through lack of leadership. In this general category might be considered The American Nature Association and *Nature Magazine,* The National Geographic Society and the *National Geographic Magazine,* The American Forestry Association and *American Forests and Forest Life,* and certainly to some degree, The American Association for the Advancement of Science and its publications, *Science* and *The Scientific Monthly.* In the case of each of these organizations, membership dues include subscription to the appropriate periodical. While some of these make a generally popular appeal, one at least does so on a professional level. The list of professional societies could be considerably increased to include The Ecological Society of America and *Ecology,* The American Society of Mammalogists and *The American Journal of Mammalogy,* The Botanical Society of America and its *Journal of Botany* and so on. As the field of interest becomes more specialized there generally comes a reduction in the number of subscribers to the appropriate periodical and consequently an increased subscription rate. It is true of course that in most of the professional societies there are professional standards which members are expected to have reached in order that membership may be secured. On occasion, the determination of whether a person does meet the standards set for membership is perfunctory but at other times it is decidedly exacting. Membership in the National Academy of Sciences is, for example, a distinct honor open only to those who have proven themselves worthy of it. By no stretch of the imagination could it be considered as being based primarily upon the ability and willingness of the members to support financially some project associated with the field of science.

Because of closely associated service of a number of government units with the activities of groups interested in nature education accounts of the functions of these units are given here though they cannot justly be considered as societies or clubs.

THE AMERICAN NATURE ASSOCIATION

Arthur Newton Pack, President

Organized in 1922 "to stimulate public interest in every phase of nature and the out-of-doors, and dedicated to the practical conservation of the great natural resources of America," the American Nature Association has as its main object nature education. The work of the Association is supported not only by the dues of approximately 110,000 members, but also through special endowments.

Its monthly publication, *Nature Magazine,* is widely known for its popular articles and its splendid illustrations in the form of photographs, etchings, drawings and paintings by the best nature artists. The Association maintains a Scientific Consulting Board made up of scientists in each of the various fields, thus assuring as far as possible the presentation of scientifically reliable material in *Nature Magazine* and offering facilities for answering the special inquiries and questions of its members.

Until 1928, a section of *Nature Magazine* was devoted each month to problems of teachers and pupils. However, such was the demand from educational sources for more material of this kind, and such has been the restriction of space in *Nature Magazine* in order to be able to present all the various problems of interest, that it was decided to found a new publication particularly for the educational field. Thus, in October, 1928, the Association undertook the publication of *The Nature and Science Education Review,* a quarterly periodical dealing with the pedagogical problems of nature study and science education. The *Review* also served as an educational index to *Nature Magazine* and gave practical suggestions for the use of the material therein contained. Because of lack of subscription support it was discontinued in 1930.

The Association maintains close contact with the various outdoor camping groups, and during the summer of 1927 conducted a traveling school of nature lore for private camps, under the direction of William G. Vinal, of the Cleveland School of Education at Cleveland, Ohio.

The Association has developed a system of personally conducted travel parties during the summer vacation season. These parties are limited to twenty persons, and each is accompanied by a member of the Association's staff. During the time spent by these parties in the National Parks and similar areas of particular interest, a trained nature guide also accompanies each group. The expense for these educational trips has been maintained at a minimum, thus making it possible to extend the privileges of travel and field work under the most ideal circumstances to many who would otherwise be unable to accomplish so much. The trips during the season of 1929 were extremely successful. During the season of 1930, specially conducted parties under the auspices of the Association visited Glacier National Park, Jasper National Park in Canada, the coast district of British Columbia, the Pueblo Indian country of New Mexico, the Grand Canyon, Zion and Bryce National Parks, and Yellowstone National Park.

Among the other outstanding activities of the Association has been its campaign for the protection of roadside beauty, the object being to preserve the picturesque simplicity of rural scenery, with special reference to the abuses of outdoor advertising, and to promote a similar regard for dignity and amenity in towns. Cooperating in this movement are the National Council for the Protection of Roadside Beauty, the Garden Club of America, the General Federation of Women's Clubs, State Garden Club Federations, and a very large number of other organizations.

In the field of conservation, the Association supports the best educational use of our National Parks. It has assisted in solving various problems of National Park administration, such as the purchase of private lands within the boundaries of certain National Parks. In the field of forest conservation the Association has played a prominent part. The Association does not oppose necessary cutting and utilization of forest trees in the most effective manner, but insists that other trees shall be made to grow in their stead.

The Association is cooperating in the preparation of visual aids to nature education. Two seasons were spent by the field staff of the Association in the preparation of a picture, " Camera Hunting on the Continental Divide," depicting the life of such animals as the Rocky Mountain goat, bighorn sheep, deer, bear, elk, moose, beaver, and other smaller mammals. William L. Finley is now lecturing under the auspices of the American Nature Association, using these motion pictures. Simultaneously the field staff of the Association has been working on the production of another motion picture film depicting the wild life of the southwestern and desert country. Dr. Palmer is cooperating with the Eastman Teaching Films, a subsidiary of the Eastman Kodak Company, in the preparation of a comprehensive visual education course in nature study.

The Association stands for the protection and humane treatment of animals. It repeatedly presents the cause of preserving the balance of nature, and is opposed to thoughtless extermination of wild species. It constantly calls attention to the abuse of humane principles in the use of the steel trap.

The officers of the Association are: Charles Lathrop Pack, Chairman, Board of Directors; Arthur Newton Pack, President; Percival Sheldon Ridsdale, Secretary-Treasurer; Richard W. Westwood, Assistant Secretary. Associates include: E. Laurence Palmer, Director of Nature Education; R. Bruce Horsfall, Art Director; Edward A. Preble, Staff Naturalist; William L. Finley, Field Naturalist. The offices of the Association are at 1212-1214 Sixteenth Street, Washington, D. C.

SCIENCE SERVICE, INC.

Science Service, Inc. was founded in 1921 for the purpose of popularizing science. It maintains correspondents in various centers of research throughout the world. It is controlled by a board of trustees appointed by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, journalistic professional representatives and the E. W. Scripps estate. It holds no public meetings.

Science Service publishes *Science News-Letter* which is devoted entirely to science, appears weekly, prints approximately 832 pages a year and has a subscription rate of $5 a year. Special subscription rates are available to clubs and schools where quantity orders may be entered. While most of Science Service's publications are for reprinting by newspapers and magazines, a large list of books have been written by members of the organization and printed by commercial publishers.

The whole operation of Science Service is educational. It is estimated that every fourth newspaper reader of the United States has the opportunity of reading something by Science Service, weekly or daily. There is also wide distribution of Science Service material through magazines, foreign journals, books and the radio. " Nature's Notebook " by Dr. Frank Thone is possibly one of the best known contributions to newspapers and of interest to nature readers.

During 1930, there was organized the " archaeological minute men " who were authorities scattered over the country authorized to report immediately new items of interest for general publicity. Science Service has cooperated in the location of earthquakes jointly with the United States Coast and Geodetic Survey, the Jesuit Seismological Association and seismological observatories throughout the world since 1925.

The headquarters office is at Twenty-first and B Streets, Washington, D. C. The managing editor is Watson Davis. The board of trustees include J. McKeen Cattell of The American Association for the Advancement of Science, John C. Merriam of the National Academy of Sciences, Vernon Kellogg of the National Research Council, John Finley of the journalists profession and Harry L. Smithton of the E. W. Scripps estate.

NATIONAL EDUCATION ASSOCIATION
DEPARTMENT OF SCIENCE INSTRUCTION
E. Laurence Palmer, President

The Department of Science Instruction of the National Education Association was organized at the Denver meeting of the National Education Association in 1895. Its first Chairman was Dr. Charles S. Palmer of the University of Colorado and its first President, Professor Bessey of the University of Nebraska. Among those speaking at the initial meeting were Professor Jackman of the University of Chicago, Professor G. F. Atkinson of Cornell University, the then President of the National Education Association, Nicholas Murray Butler, Professor Le Conté of the University of California and Mr. Twiss of Cleveland, who later became a prominent leader in science education.

It is obvious that, from the first, the Department centered its interests around science in the secondary school levels. In fact, it does not seem that any consideration was given science at the elementary school levels in any of the programs for the first four years. The program for 1900, however, dealt almost entirely with this phase of the work. Since that time, the program has in a way reflected the recognition given science at the various grade levels.

The originally stated aims of the Department were rather specific. They aimed " to limit the number of science subjects taught, to insist that each subject shall cover at least one year; to improve the methods and matter of laboratory work and all that is implied therein; and to determine, if possible, the proper order of the natural sciences suitable for and fundamental to the courses of the secondary schools."

In 1897, the Department recommended a science sequence of physical geography, physics, chemistry and biology. It was further advocated that three years of one science was preferable to three sciences of one year each on the grounds that such a program would help in " getting better teachers, more thorough discipline without being more specialized than the good, dignified old classical preparatory course." It was pointed out that such a course could be combined with " the other essentials of discipline and culture so as to make a good strong course " and further that it " will remove the charge of superficiality and dilettantism now justly urged against our one year courses." In 1902, the first consideration was given to agriculture as a high school science. In 1909, O. W. Caldwell was president and a rather exhaustive historical survey of high school science was presented. As yet, however, no paper of the type recognized to-day as a research paper was presented. Practically everything was of the opinion type. In 1912, David Starr Jordan was President and that year a valuable paper of the research type appeared attempting to classify public school pupils psychologically. Another paper appeared the same year dealing with adolescent efficiency and still another dealing with practical botany for the rural high school. The last paper was by G. A. Works, now Professor of Higher Education at the University of Chicago.

The 1914 meeting in St. Paul was presided over by Professor Twiss of Ohio State University. This program was one of the most ambitious the Department has enjoyed and boasted some good curriculum studies. The sessions extended through five days. This high level of interest was maintained for the next two years until the war appeared. Then for a period of four years there seemed to be little evidence of strong interest. The interest picked up and by 1924 with Professor Eikenberry as President a strong program appeared at Washington. One of the first papers dealing with a comparison of various methods of teaching science appeared in this year. This involved a consideration of the relative merits of the demonstration and laboratory methods. The paper was read by F. G. Ambel. The year before, Otis W. Caldwell had presented a paper advocating a six-year science sequence and the year following the Department made a departure from its previous program and held one session as a joint meeting with the American Nature Study Society. That courtesy has been observed until the 1930 meeting when the Society failed to submit a program of its own and the Department prepared its own program giving some consideration to the elementary school science but emphasizing the work in the secondary levels.

The Department has not always seen fit to select as its officers those individuals who have been doing outstanding work in science education. Many names of individuals appear as President who have otherwise done little in science education. Such names as Schmucker, Jackman, Downing, Comstock, Bailey, Powers, Craig, Black, Hollinger, Edwards, Pack, Bigelow and others equally well known do not appear in the roll of Presidents. It is possible that the Department has not made the most of its opportunities with the result that other organizations whose work should have been done by the Department have appeared independently. The officers of the Department for 1930 were E. Laurence Palmer, President, Ralph Watkins, Secretary. The address of the Department is through the National Education Association in Washington. Meetings are held with the summer meeting of the National Education Association the 1930 meeting being at Columbus, Ohio, July first and second. The officers for 1931 are Ralph Watkins, President, Charles Lincoln Edwards, Secretary.

THE AMERICAN NATURE STUDY SOCIETY

Ellen Eddy Shaw, Secretary

The American Nature Study Society was organized and held its first meeting on January 2, 1908, at the University of Chicago, under the leadership of Prof. M. A. Bigelow of Columbia University.

Its purpose is to promote critical investigation of all phases of nature education; to work for the establishment in schools of such nature education as has been demonstrated to be valuable and practical; to cooperate and encourage organizations interested in nature activities not directly associated with schools and to undertake research concerning the value of nature work in education generally.

Two branches are maintained, the Pacific Branch and the Webster Groves, Missouri Branch. The Society is affiliated with the American Association for the Advancement of Science and since 1926 has had one representative on the council of that Association. Since 1925, it has held meetings annually with the National Education Association through the courtesy of the Department of Science Instruction of that Association. Its regular meetings are, however, held with the American Association for the Advancement of Science. The July meeting was held in 1930 at Columbus, Ohio. The December meeting of that year will be held in Cleveland, Ohio. The meeting for December, 1931, will be held in New Orleans. In addition to affiliation with the two organizations mentioned above, there is close cooperation with the School Garden Association, the Coordinating Council on Nature Activities and the National Council of Supervisors of Elementary Science.

There are three types of membership: active membership, student membership and branch membership. The dues for active membership are $1 a year and for the other types 25 cents a year. There are 225 active members and approximately 600 individuals were directly reached by the activities of the Society during the last year.

Membership is open to any person interested in any phase of nature study or elementary science whose name has been acted upon favorably by the Council.

With the formation of the Society in 1908, it assumed responsibility for the publication of the *Nature Study Review,* which had been published since 1905. This project was carried on until 1924 when the *Nature Study Review* was merged with *Nature Magazine.* When the need appeared to be evident, *Nature Magazine* undertook the publication of the *Nature and Science Education Review* and this by vote of the Society in 1928 became the official channel for the publication of its papers.

In 1924, under the presidency of M. R. Van Cleve, the Society published the "First Yearbook of the American Nature Study Society." Support for this was supplied by the American Nature Association and in 1925 members of the American Nature Study Society cooperated in the publication by the American Nature Association of the bulletin, "Nature Education in Elementary Schools." This cooperation was continued and had considerable influence on the success of "The Survey of Nature Education in the Schools of the United States" published in 1927 in *The Nature Almanac* by the American Nature Association.

While the Society has never been large, it has always had the support of the leaders in the field of nature education. It now has committees working on a number of research problems.

The officers for 1930 include the following, President, Bertha Chapman Cady; Secretary-Treasurer, Ellen Eddy Shaw, Brooklyn Botanic Garden, Brooklyn, New York.

SCHOOL GARDEN ASSOCIATION OF AMERICA

David A. Ward, President

The School Garden Association of America was founded in 1910. The purpose, as stated in the Constitution adopted in San Francisco in 1911 is as follows:

1. To arouse public interest in the great value of school gardens as a means of educating children.

2. To provide means for profitable discussion of the phases of the movement.

3. To distribute helpful school garden literature.

4. To carry on profitable experimentation in school garden work.

5. To promote the establishment of school gardens in America.

The membership of the Association is now approximately two hundred.

The School Garden Association of America meets annually at the same time and place as the summer meeting of the National Education Association. The meeting place for 1930 was Columbus, Ohio, where the meeting was held on June thirtieth. Its program thus immediately preceded that of the Department of Science Instruction of the National Education Association which held a meeting on July 1st for the interests of elementary school science and on July 2nd for the interests of secondary school science. Such integration of the programs of the two groups has been rather consistent though there is no official affiliation between the two groups.

Membership of the School Garden Association of America includes teachers, school officials and any other persons interested in the development of school gardens. The annual dues are one dollar.

The present officers of the Association are as follows:

President, David A. Ward, Superintendent of School, Chester, Pennsylvania; Secretary, Byron J. Pickering, Chester, Pennsylvania; Treasurer, H. C. Irish, Supervisor of School Gardens, St. Louis, Missouri.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Department Q—Education

Department Q of the American Association for the Advancement of Science was founded for the purpose of providing opportunity for research workers in education to present papers on their investigations and to discuss these papers.

With the Department are affiliated Phi Delta Kappa and Kappa Delta Pi. Meetings are held annually with the Association and membership in the association is essential to membership in the department. There are several hundred members of the Department. Interest in research in education is required of those seeking membership. One session of the meeting in 1929 was devoted to problems of science teaching. The regular programs vary from year to year depending upon the research problems which have been carried to such a stage that they may be presented for discussion.

The American Association for the Advancement of Science is responsible for the publication of *Science,* a weekly, and *The Scientific Monthly* though neither of these journals is a peculiar responsibility of Department Q.

The Secretary of Department Q for 1930 is W. L. Uhl of the University of Washington, Seattle, Washington.

NATIONAL COUNCIL OF SUPERVISORS OF ELEMENTARY SCIENCE

Gerald S. Craig, President

The National Council of Supervisors of Elementary Science was formerly known as the National Council for Supervisors of Nature

Study and Gardening. Before bearing this name, it was known as the National Council of Supervisors of School Gardening. It was formed in February, 1920, to encourage the teaching of gardening and nature study in elementary and secondary schools and to promote school-supervised gardening in all its phases.

The Council meets annually with the Department of Superintendence of the National Education Association though it has no definite affiliation with that organization.

Membership is limited to teachers and supervisors of nature study, elementary science or gardening in active service. The dues are $1.00 a year. Membership has rarely been over thirty though the attendance at the annual meetings has been as high as one hundred.

The papers presented at the annual meeting have been published in *Nature and Science Education Review* and in *Science Education.* During the last year, research committees have been working on the following problems of elementary school nature study and science: 1. The crystallization of the objectives and aims. 2. An investigation of the nomenclature. 3. An investigation of the problems of testing.

The officers for the year 1930 include the following: President, Gerald S. Craig, Columbia University; Vice-President, J. M. McArthur, New Orleans Normal School; Secretary-Treasurer, Helen Dolman, Ypsilanti State Teachers College.

CENTRAL ASSOCIATION OF SCIENCE AND MATHEMATICS TEACHERS, INC.

W. F. Roecker, Secretary

The Central Association of Science and Mathematics Teachers was founded in April, 1903. The purpose of the organization is expressed as follows:

1. To facilitate the interchange of ideas and information of interest to teachers of science and mathematics.

2. To encourage personal contacts and acquaintanceships at meetings held under the auspices of the Association.

3. To establish professional standards.

4. To stimulate investigation and research.

5. To collect, compile, publish and disseminate educational articles, professional contributions, and statistics of interest to the public and teachers of science and mathematics.

The organization has no branches or affiliations. It holds annual meetings, the next one being held at Milwaukee, Wisconsin, November 28, 29, 1930.

There are about 800 members, the same being teachers in high schools and colleges, junior high schools and private schools. Any teacher interested in the teaching of science or mathematics is eligible to regular membership. The annual dues are $2.50, the payment of which entitles the member to the official journal, *School Science and Mathematics.*

The journal of the Association prints about 1000 pages per year, 65 per cent to 70 per cent of which are devoted to science teaching. It appears nine times a year. Reprints, old proceedings and edited monographs are now being prepared from the published material.

No books have been published as such to date. A doctor's dissertation on the teaching of general science by various methods is about to go to press, however, and pamphlets are published containing programs and announcements and concerning science and mathematics plays.

The Association has supported officially campaigns for the Red Cross and has helped in health campaigns. It maintains a research department in its journal that is directly interested in classroom efficiency and the dissemination of professional contributions. No research is subsidized by the Association.

The officers of 1930 of the Association include the following: President, Walter G. Gingery; Vice-President, H. Clyde Krenerick; Secretary, W. F. Roecker; Treasurer, E. S. Martin.

The business office is located at 1439 Fourteenth Street, Milwaukee, Wisconsin.

NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING

S. R. Powers, Secretary-Treasurer

The National Association for Research in Science Teaching was organized in Boston in 1928 for the purpose of promoting research in science education. Its meetings have been held regularly at the same time and place as the meetings of the Department of Superintendence of the National Education Association though there is no official connection between the two organizations. The organization has no branches and no affiliations.

Membership is limited to research workers, supervisors and teachers working in the field of science education who by training and work have shown their interest in the efficient teaching of science in the elementary school, the junior and senior high school, the college and the teacher training institution. There are less than fifty members of the organization. The annual dues are five dollars.

The organization sponsors the quarterly journal, *Science Education,* which was formerly known as the *General Science Quarterly.* This journal prints approximately 400 pages per year, all of which are devoted to problems in science education. The subscription is $1.50 a year and non-members may secure the journal upon payment of the subscription amount. The organization has not sponsored or published as yet any books or pamphlets.

The officers for the year, 1930-31 include the following: President, Elliot R. Downing, Chicago University; Secretary-Treasurer, Samuel R. Powers, Columbia University.

BOY SCOUTS OF AMERICA

James E. West, Chief Scout Executive

The Boy Scouts of America was founded in 1910. The purpose of this corporation is " to promote through organization and cooperation with other agencies, the ability of boys to do things for themselves and others, to train them in Scoutcraft, and to teach them patriotism, courage, self-reliance, and kindred virtues, using the methods which are now in common use by Boy Scouts." It places emphasis upon the Scout Oath and Law for character development, citizenship training and physical fitness.

There are maintained 633 Local Councils which are the local representatives of the National Office. In addition, lone scouts may be registered through these councils or directly through the National Office. Official or unofficial affiliations are maintained with local churches, schools, service clubs, conservation organizations, forestry bureaus and fish and game associations.

The National Council meets annually, the last meeting having been held in May, 1930, in New York City.

Membership is open to boys and to adult men. The total membership is as follows: adult membership, 303,327, boy membership, 877,900. This makes a total of 1,182,259 to which should be added 1,032 professional leaders devoting their entire time to the work. Adult membership is limited to persons, 21 years of age who are American citizens or have declared their intention of so becoming. Boy membership is limited to boys over twelve years of age who take the Oath of Allegiance to the Flag of the United States and subscribe to the Scout Oath and Law. The annual dues of adult members is one dollar; that of boys, fifty cents.

Scouts advancing to the rank of First Class Scout are required to make some mastery of work in nature study. In addition, there is abundant opportunity for advancement and improvement in nature work in the merit badge work.

Boy Scouts of America publishes the monthly, *Boys' Life,* which averages 70 pages in length, some portion of which is devoted to nature work. Its subscription rate is $2.00 a year. In addition, the monthly magazine *Scouting* averaging from 24 to 40 pages is available to scout leaders and has a subscription rate of fifty cents a year.

Boy Scouts of America publishes the "Handbook for Boys," a book of 650 pages containing a great deal of nature work and selling for fifty cents. In addition, it has published, "The How Book," price $1.00, 420 pages; "The Handbook for Patrol Leaders," price $.75, pages 400; "Winter Camping," price $1.50, pages 320. Numerous merit badge pamphlets selling generally for twenty cents each have been prepared and sold covering such topics as astronomy, bee keeping, bird study, botany, conservation, forestry, fruit culture, gardening, insect life, nut culture, reptile study and weather.

No major expeditions for the sake of discovery have been fostered by Boy Scouts of America though three boy scouts went to Africa in 1928 with the Martin Johnson Expedition and one scout went with Admiral Byrd on his last expedition to the Antarctic. International Jamborees have been held with considerable regularity and have brought together large numbers of boys from all parts of the world with probable profit to the majority.

The National Training School for Scout Executives is located at Briarcliff Manor, New York. Here those going into scouting professionally receive preliminary training. In addition, Biennial Conferences have been held to assist in the training and development of executives already in service. Local Councils throughout the country conduct their local training courses for scout masters and other local officers. Approximately 2,000 persons received training of this nature in 1930. Nature work is given a place in the Biennial Conferences, in the local leadership programs and more particularly in the Camp Directors' Course which has recently been developed.

Five hundred and thirty-nine camps are maintained by councils of Boy Scouts of America. These camps cover an area of approximately 111,597 acres and during the summer and winter of 1929 cared for the camp experiences of 114,057 members of the organization. The camp sites and equipment are valued at $7,033,908.

The National Headquarters are at 2 Park Avenue, New York City. The major officers include: President, Walter W. Head; Treasurer, George D. Pratt; Chief Scout Executive, James E. West; Secretary of the Editorial Board, E. S. Martin.

CAMP FIRE GIRLS, INC.

C. Frances Loomis

Camp Fire Girls, Inc. was incorporated March 17, 1912. Its aim is to "provide a program of leisure time activities for girls, which shall stimulate a formation of habit making for health and character."

In 1929, there were 9,023 active Camp Fire groups throughout the country. Each group is composed of from six to twenty girls· ten years old or older, under the leadership of a Guardian who is a volunteer. In towns where several Camp Fire groups have been formed, the Guardians organize a Guardians' Association for the purpose of exchanging ideas and experiences. There are 225 of these Guardians' Associations. In many of the larger cities, Camp Fire has been recognized as a civic asset and a group of citizens has formed a Local Council with the purpose of promoting a Camp Fire program. A local executive is employed to direct the work and a Camp Fire Camp is established. There are 83 local councils. Boards of Sponsors are formed in towns where there are fewer groups. There are 85 of these boards.

Camp Fire Girls is a member of The Coordinating Council on Nature Activities.

Annual meetings are held of national significance, the 1930 meeting being held from September 4th to 7th at Worcester and Boston.

Membership in Camp Fire Girls in 1929 totalled 219,978 of which there was a British Isles membership of 2,408. Membership is limited to girls of any race, creed or nationality who are ten years of age or older. Advancement is made through evidence of accomplishment. Of fourteen units of work done to reach the preliminary rank, two are in the field of nature craft. The next rank is that of Fire Maker which requires the mastery of twenty additional units of activity not more than five of which may be in one field only.

The third and highest rank is that of Torchbearer which requires, among other things that the girl must,

1. Teach six nature games to at least three persons.

2. Earn at least one honor in five of the following classes of nature lore; birds (plumage and song), butterflies, moths, trees, shrubs, flowers, ferns, stars, insects, grasses, snakes, marine life. In winning the big honor under nature lore, conservation honors may be substituted for gardening.

3. Keep a note-book of observations, including charts, blueprints, smoke prints, snap-shots worthy of being used for local exhibits or local training courses.

4. Take five successful nature photographs of five different subjects; birds, trees, flowers or similar groups, or two successful photographs of wild life.

5. Make three excursions each to a different district with at least three persons explaining the geological history and formation of the region.

6. (a) Make a collection of six different kinds of rock or minerals found in your vicinity (if possible) and tell your Camp Fire about their geological formation. Or

(b) Collect seeds from three varieties of trees; prepare and allow them to germinate until the proper time for sowing. Sow, and transplant several of each variety and take care of them.

7. Send to National Headquarters an illustrated note-book for the permanent exhibit.

Camp Fire Girls publishes the monthly magazine, *Everygirl's,* about six per cent of which is devoted to nature work. It also publishes for its guardians, *The Guardian,* a bulletin of news and suggestions. This appears ten times a year and about twelve per cent of the content is devoted to nature work.

The *Book of the Camp Fire Girls,* the official handbook for girls, contains sections on nature and sells for fifty cents. It has appeared in editions of fifty thousand in 1924, 1925, 1928 and 1929. The *Handbook for Leaders* sells for one dollar and has appeared in editions of six thousand each in 1924, 1925 and 1928.

The *Camp Fire Nature Guide* is a pamphlet written especially for Camp Fire Girls by Dr. E. L. Palmer. It is used in connection with the loose leaf material published by the Slingerland-Comstock Company of Ithaca, New York.

During the school year 1928-29 and the summer of 1929, Camp Fire Girls conducted 119 Camp Fire Training Courses in colleges, universities and normal schools or independently. There were registered in these courses 2,716 persons, 1,951 of whom completed the work begun.

The winter courses were held in Arizona, California, Colorado, Idaho, Indiana, Iowa, Maine, Michigan, Minnesota, Missouri, Nebraska, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Texas, Washington, Wisconsin and Wyoming. Summer courses of one week duration were held by the councils at Oakland, California; Seattle, Washington; Grand Rapids, Michigan; Des Moines, Iowa and elsewhere. About fifteen per cent of the time spent in these training courses is devoted to nature work.

There are over a hundred first class camps scattered throughout the country developing the Camp Fire program. In ninety of these camps last year, 15,471 girls enjoyed the privilege of living out-doors from one week to all summer at an average cost of $6.78 per week.

Camp Fire Girls operates on a budget of approximately $150,000 a year, a great proportion of which is raised through dues and subscription to the periodicals.

Camp Fire Girls maintains a staff of four full time field members and two part-time members. These workers unite the organization and help maintain some degree of standardization. They also help in some of the larger annual projects which the organization has sponsored. In 1927, a tree-planting project was sponsored which resulted in the planting of 500,000 trees. The 1929 project centered around the planting of bulbs and the caring for window boxes which were distributed to hospitals and shut-ins at birthday time. Cooperating with the organization in the 1929 project were the Wild Flower Preservation Society, The American Nature Association and similar groups.

During 1929, 130,161 nature honors were awarded to camp fire girls as evidence of some definite accomplishments in the field.

National Headquarters of Camp Fire Girls, Inc. is maintained at 41 Union Square, New York City.

The officers include: President, Miss Florence Hughes; Treasurer, Myron T. Scudder, and Secretary and National Executive, Lester F. Scott.

GIRL SCOUTS, INC.

Girl Scouts, Inc. was founded in March, 1912, for the purpose of bringing to all girls, the opportunity for group experience, outdoor life and to learn through work, but more by play, to serve their community.

There are 333 Local Councils and 276 Community Committees. The organization is definitely affiliated with the International Council of Girl Guides and Girl Scouts and aims at cooperation with all local organizations in the communities in which it serves. The national meeting in 1930 was held at Hotel Lincoln, Indianapolis, Indiana, October first to fourth.

The total membership as of January 1, 1930, was 205,834 and includes the following classes of membership:—

Active membership, Local Councils (adults sponsoring girl scouts), Community Committee members (adults sponsoring groups in smaller communities), Troop Committee members (adults sponsoring girl scout troops and acting as advisors to the captains), Captains (adult active leaders of troops), Lieutenants, Girl Scouts, Associate Girl Scouts, Brownies.

The above membership does not include the professional leadership group such as the local executives or the national staff.

Brownies are girls from 7 to 10 years of age and Girl Scouts are girls from 10 to 18 years of age. Advancement is made through the ranks of Tenderfoot, Second Class Scout, First Class Scout and Proficiency Badges. The dues of council members are $2.00, community committee members, $1.00, brownies $.25 and all others $.50.

The official organ of Girl Scouts, Inc. is *The American Girl,* a monthly with a subscription rate of $1.50 and a circulation of 62,445. In addition, *The Girl Scout Leader,* a monthly with a subscription rate of $.50 and a circulation of 12,300, is supplied free to girl scout leaders in good standing.

The organization has published The Girl Scout Handbook which is official guide of Girl Scouts. It sells for $.80 and about 25 per cent of its pages are devoted to nature activities. In addition, a considerable number of pamphlets dealing wholly or in part with nature activities have been published by the Girl Scouts. The titles of some of these follow:

" Tramping and Training with the Girl Souts," " Girl Scout Game Books," "Kettles and Campfires," "Lone Girl Scout Trailmaker," "Lone Girl Scout Adventurer," "Girl Scout Diary, 1928, 1929, 1930," " Tree Finder Project," " Wild Flower Finder Project,"

" Bird Finder Project," " Land Animal Finder Project," " Insect Finder Project," " Rock Finder Project," " Star Finder Project," "Garden Flower Finder Project."

From 1922 to 1927, Girl Scouts conducted as a definite research activity a five year experiment in training volunteer group leaders. A number of similar ventures are planned but as yet are not definitely outlined.

Adequate leadership training has been a recognized responsibility of Girl Scouts. Approximately one-quarter of the effort devoted in training is devoted to nature study or elementary science. During the last twelve months, 11,512 individuals completed a definite course in training for leadership in the organization. This was made possible through training centers located as follows:

1. Camp Edith Macy, Briarcliffe Manor, N. Y.; 2. National Girl Scout Convention Training Camp, September 15-20, 1930, Indianapolis, Indiana; 3. Pine Tree Camp, Plymouth, Massachusetts; 4. Rock Hill Camp, Mahopac, New York; 5. Pine Grove Camp, Pine Grove, Furnace, Pennsylvania; 6. Kenowva Region Camp, Wheeling, West Virginia; 7. Camp Juliette Low, Cloudland, Georgia; 8. Camp Minnesota, Grand Marais, Minnesota; 9. Camp Hoffman, West Kingston, Rhode Island; 10. Camp Alice Chester, Milwaukee, Wisconsin; 11. Camp Mary White, Lincoln National Forest, New Mexico; 12. Camp Chaparral, State Redwood Park, California.

That the leadership training program has been effective is shown to some extent by the increased number of nature badges awarded during the last five years. The totals for these years are as follows: 1925, 5861; 1926, 8744; 1927, 10,442; 1928, 12,228; 1929, 16,854. In general, there has been a consistent increase during these years in each of the major fields of activity. The awards for 1929 numbered as follows: Observer, 6540; Rambler, 1104; Wild-flower Finder, 1692; Star Finder, 1164; Bird Finder, 1944; Tree Finder, 1932; Garden-flower Finder and Gardener, 384; Rock Finder, 388; Land-animal Finder, 1200; Insect Finder, 264; Salt-water Finder, 42.

Girl Scout Councils maintain 423 girl scout camps in various parts of the country. These are of course effective media of nature education.

The National Headquarters are at 670 Lexington Avenue, New York City. Among the important national officers are the following: President, Mrs. William H. Hoffman; Vice-Presidents, Mesdames Arthur O. Choate, Vance C. McCormick, Frederick Edey, A. Clifford Shinkle, William M. Chester, Owen D. Young, Barrett Wendell and Herbert Lehman. The National Director is Mrs. Jane Deeter Rippin and the Honorary President, Mrs. Herbert Hoover.

PIONEER YOUTH OF AMERICA

Walter Ludwig, Executive Director

The organization, Pioneer Youth of America was founded in 1924. Its purpose was " to form, maintain and guide an organization for children and youth that will function to develop in them a greater degree of self-dependence, inform them about the social and economic problems that face mankind and prepare them for intelligent participation in the work of bettering society." Its chief contribution to nature education has been through the media of the camps and sanctuaries maintained by the organization.

Branches of Pioneer Youth of America are maintained in Philadelphia and Baltimore. The organization has maintained an affiliation with the Coordinating Council on Nature Activities. The total membership is 832, a part of whom are contributing members and a part of whom are dues-paying members. Membership is open to all interested persons who pay the annual dues of two dollars or more. During the last twelve months, approximately 400 children who were not necessarily members of the organization received some of its benefits.

Joshua Lieberman is now preparing a book, " Six Years of Experimental Camping " under the auspices of the organization and the book, " Pioneers of Freedom " by McAlister Coleman has been sponsored by it.

The organization has maintained a number of civic projects among them being a Christmas toy project for children of strikers at Marion. As a development of this activity, a young woman will direct social service among these people this year.

A leadership training course was offered in 1930 under the guidance of Walter Ludwig, executive director of Pioneer Youth. Twelve individuals completed the prescribed work.

Pioneer Youth of America maintains a National Experimental Camp at Rifton, New York, the camp grounds being considered as a wild life sanctuary. During 1929, 110 individuals enjoyed the privileges of this experimental camp.

The Officers of Pioneer Youth are: President, Thomas Curtis; Vice-President, A. J. Mustes; Treasurer, Eva A. Frank, and Executive Director, Walter Ludwig. The National Headquarters is at 3 West 16th Street, New York City.

CAMP DIRECTORS' ASSOCIATION

Laura I. Mattoon, Secretary

The Camp Directors' Association was founded in New York City on March 14, 1924, when an amalgamation was effected between the Camp Directors' Association of America and The National Association of Directors of Girls' Camps.

Among its stated objects are those associated with exchange of experiences between members, formulation of plans and policies, maintenance of high standards and ideals, the promotion of conferences of directors and counselors, the organization and support of branches and the protection of the camp movement in matters of a legal nature.

There are at present nine branches appropriately named to indicate the geographical region covered as follows: 1. New York. 2. New England. 3. Pennsylvania. 4. Southern Appalachian. 5. Mid-west. 6. Pacific. 7. Mid-Atlantic. 8. Rocky Mountain. 9. Southwestern.

The Association has affiliations with the Associated Mountain Clubs of America and the Coordinating Council on Nature Activities. Meetings have been held as follows: New York City, March 14-15, 1924; New York City, March 13-14, 1925; Waltham, Massachusetts, November 13-14, 1925; Chicago, Illinois, February 19-21, 1926; New York City, April 23-26, 1926; Asheville, North Carolina, October

22-24, 1926; Philadelphia, Pennsylvania, March 11-13, 1927; Atlantic City, New Jersey, March 9-11, 1928; Atlantic City, New Jersey, March 7-10, 1929; Chicago, Illinois, February 27-March 2, 1930.

The types of membership are honorary, active, associate and counselor. The total membership is 530 including representatives of private camps, organization camps, church camps and welfare camps. Active membership is limited to experienced and active camp directors. Other members appear in the other classes. The dues of active members are $10 a year. Those of associate and counselor memberships are $5 each. In addition each section or branch has its own dues which may be as high as $10 a year.

The Association is responsible for the annual booklet " Camps and Camping " which sells for 35 cents a copy. In addition, it backs *The Camping Magazine* which appears eight times a year and has a subscription rate of $1.00 a year.

Over 150 persons completed periods of intensive training at the conferences held by the Association last year. Eight such conferences were held during 1929-30. These conferences specialized in particular camping activities as follows: 1. Swimming and Lifesaving Conference. 2. Swimming, Canoeing and Camp Craft Conference. 3. Canoeing Conference. 4. The Nature Lore School. 5. Camp Craft Conference. 6. School of Horsemanship. 7. Counselor's Training Conference. 7. Conference on Leadership Training. These were held in widely separated parts of the country. The meetings or conferences are generally held immediately preceding the opening of the camping season and are generally about one week in length. The nature lore conference has generally been two weeks in length.

The officers of the Camp Directors' Association include the following: President, Dr. John P. Sprague; Vice-President, Walter H. Bentley, Secretary-Treasurer, Mrs. Hugh Worthington; Laura I. Mattoon, Wolfeboro, New Hampshire.

THE COORDINATING COUNCIL ON NATURE ACTIVITIES

Bertha Chapman Cady, Secretary

The Coordinating Council On Nature Activities was organized in 1925 under the auspices of the American Museum of Natural History.

The activities of the Council follow these lines. 1. Reviewing the present activities of the cooperating organizations so that all may benefit by the best that each has discovered through experience. 2. Making available for use nature materials and methods which are found to be helpful. 3. Interchanging ideas, methods, experiences through personal visits, interviews and informal meetings. 4. Conducting and instituting nature training centers and cooperating with summer schools and classes for nature instruction.

The organizations cooperating with the Council include the following: American Astronomers Association, American Forestry Association, American Museum of Natural History, American Nature Association, American Nature Study Society, American Social Hygiene Association, American Tree Association, Boy Scouts of America, Brooklyn Botanic Garden, Camp Directors' Association, Children's Museum, Brooklyn Camp Fire Girls, Inc., Garden Club of America, Girls Friendly, Girl Guards, Girl Scouts, Inc., Horticultural Society of New York, National Board of the Young Women's Christian Association, National Council of Supervisors of Elementary Science, National Tuberculosis Association, New York Bird and Tree Club, New York Botanic Garden, Pioneer Youth of America, Playground and Recreation Association of America (unofficial), School Nature League, Torrey Botanical Club, Wild Flower Preservation Society, Inc., Woodcraft League of America.

The Council published " Romance of Your Birthstone " by Hope Swengel and sponsored " Mushrooms of Field and Wood " by Margaret McKenney. It also published a pamphlet, " The Place of Books in Nature Teaching and Guiding with Lists of Selected Titles " by Bertha Chapman Cady.

Training activities have been centered around the early summer season. In 1928, the Council took over the responsibility for running the Nature Lore School. In that year, the camp was held at Camp Andree, Briarcliffe Manor. The next year two training centers were established, one at Gardner Lake, Connecticut, and one at Cold Spring Harbor, Long Island Biological Laboratory. Approximately two hundred persons were reached in the 1929 training program. In 1930, the name, Nature Training School of the Coordinating Council On Nature Activities was given the school. In this year, the session was held from June 9th to 27th at Wheeling, West Virginia in connection with the Oglebay Park nature activities. The committee responsible for the program had as its chairman, Fay Welch representing the Camp Directors' Association. With him were associated Frances Loomis of Camp Fire Girls and Ray Wyland of Boy Scouts of America. Those in immediate charge of the program were Bertha Chapman Cady and Vernon M. Cady. A fee of $50 was charged to cover all expenses of living and instruction for the two weeks.

The Coordinating Council's address is care of the American Museum of Natural History, New York City. G. Clyde Fisher is chairman of the Council and Bertha Chapman Cady, the Secretary.

THE AMERICAN HUMANE ASSOCIATION

Sidney H. Coleman, President

The American Humane Association was founded in 1877 and incorporated in 1903. It has as its purpose the prevention of cruelty to animals and to children.

The branches and affiliations of the Association include societies for the prevention of cruelty to animals, societies for the prevention of cruelty to children, humane societies and humane education societies in the United States.

Meetings are held annually, the date for the 1930 meeting being October 6th to 9th and the meeting place being Niagara Falls. The 1931 meeting will probably be held somewhere in western United States.

The total membership of 7,999 includes members of these types, non-voting, annual, associate, contributing, life, patron, benefactor and founder. The activities of the Association in 1929 reached not less than 150,000 persons not in membership. The dues for membership are as follows: non-voting, $2.00; annual, $5.00; associate, $10.00; contributing, $25.00; life, $100.00; patron, $1,000; benefactor, $5,000; founder, $25,000.

The official organ of the Association is *The National Humane Review,* a monthly totalling 288 pages with a subscription rate of $1.00 with special rates of $.75 a year to teachers, clergymen, students and clubs. The Association has published, " Humane Society Leaders in America," a 270 page book selling for $2.00. In addition, there are pamphlets published by the organization totalling some one hundred titles. About 550,000 pages are printed annually dealing with child protection, animal protection and wild life. An annual poster in color is produced also.

The Association has been behind most legislation concerned with its interests. The original legislation for the protection of livestock in transportation was secured through the Association. It has been instrumental in securing legislation in various states dealing with various forms of animal protection including humane trap legislation, dog cropping legislation and humane education in twenty-six states. It has conducted a countrywide campaign to educate the public regarding cruelty on trap lines with a program to secure better traps by means of annual humane trap contests and better protection of wild life by legislation. Inasmuch as this campaign is countrywide, it would be difficult to list the number of individual states or communities reached. Twelve annual humane poster contests have been conducted and participated in by thousands of children and art students.

The Association has prosecuted research dealing with the study of humane transportation of live stock which has led to improvement in the handling of food animals. It has studied methods of humane slaughter which has led to successful experimental work with an electric stunning device. It has made a study of conditions on trap lines in various sections of the country in order to determine the amount of cruelty and waste of wild life from the use of cruel and inefficient methods. It has aided in the purchase of food supplies which have helped save deer in southeastern Alaska and elk in Jackson Hole. It sent special relief for animals following the Santa Barbara earthquake, the Vermont Flood and the Florida hurricanes. It has conducted an investigation in oil fields which lead to more humane methods of handling draft animals. It has made wide investigations into conditions of cattle and sheep on the public domain and on big stock ranches.

The National Office is located at 80 Howard Street, Albany, New York. The major officers include: President, Sidney H. Coleman; 1st Vice-President, Peter G. Gerry; 2nd Vice-President, Franklin L. Baldwin; 3rd Vice-President, Albion E. Lang; Secretary, N. J. Walker, and Treasurer, H. P. Schoenberner.

THE PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA

H. S. Brancher, Secretary

The Playground and Recreation Association of America was founded in 1906. It has as a purpose that of bringing to every boy, girl and citizen of America an adequate opportunity for wholesome and happy play and recreation. It maintains no major branches though it is represented in approximately six hundred local communities in a private or official capacity.

A national meeting is held annually, that of 1930 being at Atlantic City, in October.

There are approximately 15,000 contributing members each of whom have paid dues of $5.00 a year or more, though the organization reached in some definite way more than twice this number during 1929.

The Association publishes the monthly magazine, *Playground and Recreation*. An average of three pages in each issue is devoted to nature activities. In addition, many articles are published on county and municipal parks and on recreation in national forests which have a definite contribution to nature education. In 1927, the Association published *Nature Almanac* for 1927, a thirty-two page pamphlet selling for forty cents and prepared by Dr. W. G. Vinal of Western Reserve University.

In connection with the National Recreation School conducted by the Playground and Recreation Association about forty-five students are taken on a week end camp and for three days are given instruction in nature activities by Dr. Vinal.

The National Headquarters are located at 315 Fourth Avenue, New York City. The Secretary of the Association is H. S. Brancher.

THE AGASSIZ ASSOCIATION

Dr. Edward F. Bigelow, President

The Agassiz Association was originated in 1875 by Harlan H. Ballard. It was officially incorporated in 1910. The purposes of the Association as set forth in the Charter of Incorporation are centered about the promotion of scientific education, the advancement of science, the collection in museums of natural history of scientific specimens, the employment of observers and teachers in the different departments of science, and the general diffusion of knowledge. The spirit of the Association is of a kindly, helpful nature rather than of the aggressive, propagandist type. The organization is informal rather than formal and stresses exchange of ideas between members.

There are three kinds of membership: student or corresponding membership, chapter membership and cooperating membership. In general, qualification for membership rests largely upon the candidates' willingness to emulate so far as possible the methods and ideals so characteristic of Louis Agassiz. The annual dues of student members are $2.00 and in addition members are required to make a report at least once a year of their activities. Chapter dues are $2.50 a year in addition to five cents due from each chapter member. A chapter may be formed by as few as three individuals. Student or corresponding members receive *The Guide to Nature* as a part of the privileges of membership. Other types of membership come under the heading of cooperating membership and depend considerably upon the financial support given. These memberships are designated as sustaining members, honorary members, life members, patrons, founders and benefactors. The amounts of dues vary from $5 annually to $25,000 paid in one sum.

There are no regularly scheduled national meetings of members of The Agassiz Association. The Board of Trustees meets officially and annually on Agassiz's birthday, May 28th.

The official publication of the Association is *The Guide to Nature* which in 1930 was in its twenty-second volume. In addition, the Association has supported a considerable correspondence with the field and worked a broad and rather remarkable influence on many individuals now in places of high rank. Volume XXI, Number 4 of *The Guide to Nature* contained a summary of many letters received from well known persons who through first hand knowledge recognize the merit of the contribution of the Association.

The home of the Association is at Arcadia at Sound Beach, Connecticut. This has represented the headquarters since 1909. Some seventeen buildings make up the home group and these include dwellings, observatories, greenhouses, sports pavilions, dormitories, laboratories, libraries, mess halls and other structures.

The Board of Trustees include the following officers: President and Treasurer, Edward F. Bigelow; Vice-President, Harlan E. Beats; Secretary, Homer S. Cummings; and among others David Starr Jordan and L. O. Howard.

BURGESS RADIO NATURE LEAGUE

Thornton W. Burgess, Director

The Radio Nature League is the outgrowth of a series of short talks through Westinghouse station WBZ at Springfield, Massachusetts, which were put on by Thornton Burgess in the fall of 1924. These talks met with such immediate and widespread favor that Mr. Burgess conceived the idea of a nature league of radio listeners. Accordingly, on January 7, 1925, he announced the birth of the League calling it the Radio Nature League. He set forth the purpose as follows:

" To do everything possible to preserve and conserve all desirable American Wild Life, including birds, animals, flowers, trees and other living things; also the natural beauty spots and scenic wonders of all America."

All who are interested and willing to do what they can to support the purpose as set forth are invited to enroll, giving name, age and address. Nearly 50,000 have been so enrolled. The bulk of these are in New England because of the fact that WBZ is not heard with any degree of regularity outside of New England due to interference with other stations. Until October, 1929, the meetings were on Wednesday evenings at 7:30. Since then, they have been held on Saturday evenings at 8:15 and continue for a full half-hour. The organization is of course not incorporated. It has coordinated its activities with some of those of the Boston Society of Natural History and the Museum of Comparative Zoology of Harvard University.

The League has sponsored various campaigns such as have been associated with feeding of birds in winter, the protection of the ruffed grouse and the destruction of tent caterpillar egg masses. Some idea of the effectiveness of the League may be shown when it is stated that three requests resulted in the known destruction of 1,102,659 egg-masses of tent caterpillars.

Communications relative to the League should be directed to Thornton W. Burgess, Hotel Kimball, Springfield, Massachusetts.

IZAAK WALTON LEAGUE OF AMERICA, INC.

Cal Johnson, Director of Public Relations

The Izaak Walton League was organized in Chicago in January, 1922, by a group of fifty-four outdoor men. They named the organization in honor of the renowned Izaak Walton because of his philosophy of outdoor living and the precepts of true sportsmanship as exemplified by him and enunciated in his famous writings.

The founders launched a restoration program which so appealed to the public that within a year there were hundreds of local chapters and the membership soared into the thousands. In general, the League considers itself an unofficial arm of the government consecrated to the cause of conservation and opposed to the needless destruction of America's natural resources, her wild life, her scenic beauty spots, her forests and waters. It coordinates the activities of its members and chapters towards the promotion of the restoration of forests and the removal of pollution from streams. It aims to give wild life better protection and increase the opportunities for wholesome outdoor recreation to the end that the present generation may transmit to posterity something of the outdoors of its predecessors.

Among its national projects are the following:

The League started a campaign in 1923 resulting in the establishment of the Upper Mississippi Wild Life and Fish Refuge, an area 300 miles long containing 300,000 acres and lying between Lake Pepin, Minnesota, and Rock Island, Illinois.

The League started a campaign early in 1925 and raised $40,000 with which were purchased 2,000 acres of haylands of use in saving the Jackson Hole elk herd. This refuge was presented to the government in 1927.

The League sponsored the enactment of the Hawes Law which was approved by President Coolidge, May 20, 1926, and which stopped the marketing and interstate shipment of black bass.

The League was identified with the saving of the Superior National Forest in northern Minnesota as a wilderness area and is now promoting a plan for the joint development of the first international recreational area in the Quetico-Superior region.

In 1927, the League inaugurated an ambitious anti-pollution campaign designed to result in a wide-spread purification of natural waterways.

In 1924, it started a concerted campaign associated with the setting aside of 40,000 acres of Horicon Marsh, Wisconsin, as a wildlife and fish refuge. This was definitely accomplished in 1928.

It promoted a " Save the Western Ducks Campaign " by which legislation was approved by President Coolidge on April 24, 1928, to appropriate $350,000 for flooding almost 100,000 acres of the Bear River Marshes to serve as a breeding ground and refuge for wild fowl.

The League took a prominent part in 1928 in establishing a definite program of national forest purchases in the Lake States, the South and the East.

Through the efforts of the League and of other groups the destruction of the beauty of the Royal Gorge in Colorado by power interests was averted in 1928.

It also played a prominent part in supporting the passage of the Norbeck Andersen Refuge Bill signed by President Coolidge on February 18, 1929, whereby a nation-wide system of inviolate migratory bird refuges will be established and authorizing the appropriation of $8,000,000 during the succeeding ten years to make the program effective.

The League is the owner and publisher of the monthly magazine, *Outdoor America.*

The headquarters of the Izaak Walton League are at 549 West Randolph Street, Chicago. President Hoover is the Honorary President and the other officers include the following: President, Henry Baldwin Ward; Treasurer, Glenn Griswold; Secretary, Wheaton Augur.

THE NATIONAL ASSOCIATION OF AUDUBON SOCIETIES

T. Gilbert Pearson, President

The Audubon Society is the oldest membership organization in the United States devoted entirely to the protection of birds and other wild animals. The first society bearing this name was formed in New York City in 1886. Today its name is known throughout the world wherever people are interested in the study of protection of birds. It has been the leading influence in arousing the nation-wide interest that today exists on these subjects.

The Audubon Society consists of local and state groups and the national Association, with its Junior Audubon Department. More than one hundred societies and bird-clubs of adults are affiliated by membership with the national organization. There are active state societies in Massachusetts, Rhode Island, Connecticut, New

Jersey, District of Columbia, Florida, Michigan, Ohio, Indiana, Illinois, New Hampshire, Kansas, Oregon and California. State and local groups devote themselves largely to the study of the birds of their regions and in promoting local interest in bird-protection. They conduct bird-talks and hold public meetings. Some have bird-sanctuaries and some give courses in bird-study, publish periodicals, distribute literature and give regular lecture-courses.

The " National Association of Audubon Societies, For the Protection of Wild Birds and Animals," is incorporated under the laws of New York State and is a very large and active organization.

The main features of its work may be listed as follows:

1. It is active in securing legislation and in most of the States the "Audubon Law" now protects the beautiful and valuable non-game birds. Its influence has been exerted in Congress and in many state legislatures on behalf of great numbers of laws all bearing on the preservation of the wild life of our country. Its campaigns resulted in the passage of laws that put to an end the traffic in feathers for adorning women's hats that years ago cost the lives of millions of our finest birds.

2. It publishes and distributes more than five million pages of literature annually in the form of education leaflets, bulletins, circulars and bird-cards. These are distributed at cost or much less than cost of manufacture and handling. It is the largest producer of colored pictures of birds made from drawings by America's best bird-artists. Its organ, " Bird-Lore," has the widest circulation of any bird-magazine in the world.

3. It has long conducted surveys to discover breeding colonies of ducks, terns, gulls, herons, egrets, ibises, and other water-birds and employs about thirty guards to protect such areas.

4. Its ten lecturers give illustrated talks in schools and elsewhere.

5. It organizes about 350,000 school children annually into " Junior Audubon Clubs," in the United States and Canada. The total enrollment since beginning this phase of the work in 1911 to April 1, 1930, has been 4,327,477. These Junior Members and their teachers are supplied pictures, leaflets, and Audubon buttons at an annual cost of about $35,000 more than the sum received from the children's ten cent fees.

6. It makes exhibits, helps writers, supplies at cost colored stereopticon slides to schools, lecturers and others; gives advice as to the best bird and animal books, bird-charts, field glasses to purchase; directs nature-students to good places to study special birds, and its offices serve as a clearing house for information on various topics of natural history.

7. It encourages the establishment of bird-sanctuaries by state and federal authorities and by private enterprise in cemeteries, on golf club properties, estates and elsewhere.

8. It works with other agencies in creating and guarding reservations for valuable game-animals, such as deer, antelope, elk and bison. It financed the establishment of the 30,000-acre Charles Sheldon Reservation for antelope and sage hens in northwestern Nevada.

9. It cooperates with national and state departments of conservation and is one of the group of national conservation organizations supporting the National Committee on Wild-Life Legislation. This committee is composed of five members elected at large and one chosen from each of the following groups: American Game Protective Association; Izaak Walton League of America; International Association of Game, Fish and Conservation Commissioners; Western Association of State Game Commissioners; American Forestry Association; and the National Association of Audubon Societies.

10. It was active in the creation of and helps support the International Committee for Bird Preservation, composed of national sections organized by official appointees of the leading scientific and bird-protective societies in twenty-one countries as follows: Austria, Australia, Belgium, Canada, Czechoslovakia, Denmark, Equador, Finland, France, Germany, Great Britain, Hungary, Italy, Japan, Netherlands, New Zealand, Norway, South Africa, Sweden, Switzerland and United States.

To handle the great volume of office-work a force of about twenty-five assistants is required. The National Association is supported by the income of an endowment that has now grown to more than one and one-quarter million dollars and the fees and gifts of more than ten thousand adult members. The fees for membership are $5.00 annually for sustaining membership and $100.00 paid once for life membership. Anyone interested in the objects of the Association is welcome to membership and more funds are greatly needed to help meet its constantly expanding responsibilities.

BIRD SANCTUARIES AND RESERVATIONS

The bird-reservation and sanctuary plan developed with the Audubon Societies many years ago. As the idea has grown three classes of sanctuaries have evolved: (a) for small land birds; (b) for non-edible water-birds; and (c) for ducks, geese and shore-birds. One example of each class of those owned and protected by the Association may be mentioned.

Roosevelt Bird-Sanctuary. This sanctuary at Oyster Bay, Long Island, comprises about twelve acres. It surrounds on three sides the little cemetery where Theodore Roosevelt lies buried. It is in charge of Doctor Eugene Swope, whose home is on the grounds. The Court of the Fountain, containing the magnificent work of bronze by Bessie Potter Vonnoh, is visited by more than 30,000 persons annually. The main sanctuary, carefully guarded and surrounded by a cat-proof fence, is not open to the public, although parties are conducted through it.

Orange-Lake Sanctuary. This is a half-submerged island in Orange Lake, Alachua County, Florida. The Association here owns forty acres. Birds resorting to this area to breed in great numbers, include egrets, snowy egrets, little blue herons, Louisiana herons, night herons, Ward's herons, water turkeys, white ibises, and at times a few glossy ibises. Mr. M. N. Gist of McIntosh is the local agent in charge.

Rainey Wild-Life Sanctuary. This is a marshland of about 26,000 acres bordering on the Gulf of Mexico and lying about one hundred and forty miles west of New Orleans. It was the shooting preserve of Paul J. Rainey. After his death his sister, Mrs. Grace Rainey Rogers, in 1924, presented the territory to the Audubon Association, together with a splendid endowment for its upkeep. Mr. Richard Gordon is the resident superintendent. The territory is carefully patrolled and large quantities of grain are fed to tens of thousands of blue geese, lesser snow geese, and various species of ducks that resort to the region. One hundred and forty-two species of birds have thus far been recorded on the Sanctuary.

Other Sanctuaries. Fifty-nine sanctuary-islands, lakes and other areas are now under the Association's care. These are in the states of: Connecticut (6); Florida (15); Georgia (3); Louisiana (11); Maine (10); New Jersey (1); Nevada (1); New York (2); North Carolina (1); South Carolina (2); Texas (5); and Virginia (2).

THE WILD FLOWER PRESERVATION SOCIETY, INC.

P. L. Ricker, President

The Wild Flower Preservation Society, Inc. was founded April 23, 1902. Its stated objects concern " the protection of rare native plants, establishment of plant preserves and the education of children and the general public in their appreciation and proper enjoyment."

Branches of the Society are rather numerous and include the following: Ohio State Society at Cincinnati, Kentucky State Society at Covington, Illinois at Chicago, Wisconsin at Milwaukee, New York at New York City, Pennsylvania at Philadelphia, District of Columbia at Washington and local Societies at Minneapolis, Topeka, Baltimore, Macon, Georgia, Seattle, Cleveland and St. Louis. A general district society with headquarters at Boston is known as the New England Society.

Annual meetings of the National Society are held in January in Washington, D. C.

All officers of the Society except clerks are volunteer workers though the organization is sufficiently large to number an adult membership of about 10,000 and a junior membership of over 100,000. In addition to helping its members, it is estimated that the Society reaches at least 20,000 non-members a year. Anyone interested in the objects of the Society may become a member upon election and payment of the dues which entitles the member to a subscription to the official periodical Wild Flower which prints about 48 pages a year and appears as a quarterly.

The dues of members are as follows: Annual members, $1.50; subscribing members, 5.00; contributing members, $10.00; sustaining members, $25.00; life members, $100.00; fellow members, $250.00 and patrons, $1,000.00.

In addition to publishing the quarterly, *Wild Flower,* the Society has published 93 pamphlets and leaflets of which it distributed 232,600 in 1929. Half of these were distributed free. These pamphlets include the following titles which are descriptive: " List of Flowers for Protection and Picking," " Junior Chapters and Membership," " Organization and Work for Chapters and Affiliated Societies," " Laws or Publicity for Wild Flower Protection," " The Cultivation of Wild Flowers," " Books for Plant Study," " Growing Wild Flowers from Seed," "Save the Wild Flowers, a one-act play," " State and National Flowers," " Flowering Dogwood," "Trailing Arbutus," " Plant Suggestions " (including 3 posters, 36 splendid colored post cards and 58 outline drawings of wild flowers), " The Protection of Our Native Plants," "Preserving Our Christmas Greens," "The Christmas Tree Problem," " Spare the Dogwood Campaign " and " The Voice of the Wild Flower (pageant)."

The activities of the Society pertain to a constant national wild flower campaign. Special local campaigns are put on by local organizations and individuals in which the Society cooperated by furnishing suggestions, literature, slides and films.

Expeditions of from 100 to 1,000 miles from Washington are made from 6 to 10 times a year to photograph wild flowers for slides and films and for studying the relationship between soils and plants. In addition, valuable lists are prepared to show where individual kinds of interesting wild flowers may still be found in abundance.

To assist in its publicity campaign, the Society owns one 16 mm. motion picture projector, a continuous movie projector, two stereopticons, an automatic balopticon, 1,050 lantern slides, eight full 16 mm. films, twelve standard films, 2,500 negatives, a still camera and a standard and a 16 mm. movie camera. Some of the films are loaned to schools without charge.

The National Headquarters is located at 3740 Oliver Street, Washington, D. C. The principal officers include: President, P. L. Ricker; Secretary, Clara M. Cheatham, and Treasurer, S. W. Miller.

AMERICAN TREE ASSOCIATION

Charles Lathrop Pack, President

The American Tree Association was founded in 1923. Its purpose is to " stand for a constructive policy of forest protection and extension, to increase appreciation of forests as natural resources essential to the sound economic future of the country."

The Association directs encouragement of forest and tree planting; disseminates popular forestry news for the information of editors of the daily press; and compiles and distributes forestry news and reports on legislative progress for the assistance of active foresters in the field. It maintains no branches.

The American Tree Association is very closely affiliated with the American Nature Association having the same officers and directors. Membership in the Association is free, service in tree planting or educational work being rendered in lieu of the payment of dues. Ordinary membership is obtained merely by registering with the Association the fact that the applicant has planted one or more trees. Witnesses to the planting are required, and all applications are subject to investigation by the Board of Directors. Educational membership, also free, is awarded for services in distributing for educational purposes ten or more copies of the Forestry Primer, published by the Association. Persons who have performed such services are qualified for election by the Board of Directors. The total membership is as follows: tree-planting army, 200,000, educational members, 15,000. The number of individuals not necessarily members recorded as benefiting during the last twelve months may be indicated by the fact that approximately 1,000,000 copies of " The Forestry Primer " were placed in the hands of school teachers and children in 1929. Since the publication of the " Primer," over 4,000,000 copies have been thus distributed.

In addition to service rendered by the Association through publication and distribution of " The Forestry Primer," *The Forestry News Digest* is maintained. This appears on no regular publication date but appears six or eight times a year. It is sent free to all persons interested in being kept up-to-date on forestry progress. A further service is rendered through the publication generally once a year of *The Forestry Legislative Digest* which is distributed without charge to foresters and others who may be interested.

The American Tree Association has sponsored the publication by the Macmillan Company of two books, " Our Vanishing Forests " by Arthur Newton Pack and " Forests and Mankind " by Charles Lathrop Pack and Tom Gill. The list of publications of the Association include the following titles details of which may be found in the Nature Bibliography in this volume: " Trees as Good Citizens," " The School Book of Forestry," " Common Trees of New York, New Jersey, Pennsylvania, Indiana, Ohio;" also of " How to Know the Hardwoods," " The Tree Planting Book," " Town Forests," " Floods," " Forests and the Future," " Forestry in the South," " Forestry in the Pacific Northwest," " The Forestry Almanac " (1924, 1926, 1928 Editions), " The Forestry Primer."

The American Tree Association has played a prominent part in fostering practically all forest legislation since 1923. Representatives of the Association have appeared before every congressional committee on forestry matters.

The Association, in collaboration with the Charles Lathrop Pack Forestry Trust, last year conducted a preliminary investigation of the amount of idle forest land in the various states, formerly cut over and unsuitable for further use without planting. Further research and investigation to determine this problem more accurately is now being conducted.

The Association owns and maintains its own building and headquarters at 1212-1214 Sixteenth Street, N. W., Washington, D. C. The building is a four-story, fireproof structure.

An endowment of $200,000.00 and income from various forestry trusts provide for the financial support of the organization.

The Officers are: President, Charles Lathrop Pack; Secretary, Arthur Newton Pack; Treasurer, Percival Sheldon Ridsdale; Assistant Secretary, Richard W. Westwood; Educational Director, Russell T. Edwards.

AMERICAN FORESTRY ASSOCIATION

Ovid M. Butler, Secretary

The American Forestry Association was founded more than half a century ago on the principle that education is the basis of the proper care and use of our forests. It has carried on active work of popular education in forestry and related fields. It has been essentially national in character but has localized its influence when necessary to meet local needs and demands. The Association cooperates with all organizations of boys and girls, including the public schools, boy scouts, girl scouts, camp fire girls, camps and similar organizations giving information and suggestions relating to different fields of forestry and activities that will serve to increase the children's knowledge and appreciation of nature as represented by forests.

The Association publishes a monthly magazine, *American Forests and Forest Life,* which contains many articles of an educational nature. The magazine is widely used in the public schools and in the boys' and girls' organizations. The Association also publishes pamphlets and reprints especially adapted to the use of boys and girls in nature and forestry work. It emphasizes particularly education by doing and gives suggestions for special activities in forestry in connection with the nature work of camps and schools. Examples of the type of projects fostered by the Association follow.

The Southern Forestry Educational Project was initiated in the fall of 1928. At the close of 1929, it had developed into a project sponsoring the activities of a field personnel of eleven men and seven motor trucks. These groups had given 3,500 shows on forest life to approximately 553,000 people three-fifths of whom were children. In addition the field staff had distributed forestry pamphlets and papers to the number of 600,000 and had posted 25,000 posters in schools, country post-offices, turpentine camps and other public and private places. It is believed that the work has stimulated local interest in fire protection over a considerable area and has otherwise helped in the utilization of forest lands for timber growing.

The Boy Scout Nut Planting Project was supported by the Association in 1929 by securing through public subscription $10,481.

This assisted in financing a project whereby boy scouts collected nuts on historical grounds, shipped them to Arlington Farm of the United States Department of Agriculture from whence they were redistributed after testing and grading for planting by other scouts.

State forestry contests open to boys and girls showing worthwhile service to forestry were sponsored by the Association. Among the states arranging such contests were Alabama, Colorado, Florida, Kansas, Maine, Montana, Nevada, Washington and Wyoming.

The headquarters of the Association are at 1523 L Street, N. W., Washington, D. C. The principal officers are: President, George D. Pratt; Treasurer, George C. Vass; Executive Secretary, Ovid Butler. G. H. Collingwood is the Forester of the Association and Fred E. Hornaday, Business Manager.

THE ENTOMOLOGICAL SOCIETY OF AMERICA

Edith M. Patch, President

The Entomological Society of America was founded in 1906. Its purpose was to give the study of entomology that standing which its importance in relation to all forms of human activity warrants and demands; to spread knowledge regarding insects; to bring amateur and official entomologists into touch with each other and with a central organ; to consider questions dealing with the educational side of entomology, museum methods and nomenclature and also to encourage the formation of local societies, particularly in places where entomology is not cultivated at present.

The Society is affiliated with the American Association for the Advancement of Science and with the Division of Biology and Agriculture of the National Research Council.

The annual meetings are held in December in affiliation with the American Association for the Advancement of Science. The meeting of 1930 is to be held in Cleveland, Ohio, and that of 1931 at New Orleans.

The membership is composed of members, fellows and honorary fellows. The average number of members is nine hundred, the exact number being published each year in the March number of the Annals of the Entomological Society of America. Membership is open to all persons interested in the study of insects. Fellows are those considered to have made important contributions to the science of entomology. Honorary fellowship is restricted to those outstanding entomologists whose contributions to the science have commanded recognition and veneration of their colleagues and of the public at large. The annual dues are $3 and the life membership fee is fifty dollars.

The official journal of the Society is published quarterly and is the *Annals of the Entomological Society of America.* It totals about 800 pages a year and is edited by Clarence H. Kennedy, Ohio State University, Columbus, Ohio. The subscription rate is $4.00 a year.

The Society has also been responsible for the publication of the following books appearing as the Thomas Say Foundation Memoirs: Volume 1. "Sarcophaga and Allies of North America," by J. M. Aldrich, 304 pages octavo with 16 plates. $3.00; Volume 2. "Plecoptera or Stone Flies of North America," by J. G. Needham and P. W. Claassen, over 400 pages including 50 plates. $6.00.

A financial statement of the Society including endowment is published annually in the *Annals.*

The officers consist of a President, two Vice-Presidents, a Secretary-Treasurer, the Managing Editor of the *Annals* and an Executive Committee consisting of the officers and five additional members. The President for the year 1930 is Edith M. Patch of Orono, Maine.

AMERICAN SOCIETY OF MAMMALOGISTS

A. Brazier Howell, Secretary

The American Society of Mammalogists was founded on April 3, 1919, and incorporated April 29, 1920. It has as a purpose the promotion of the interests of mammalogy by holding meetings, issuing publications, aiding research and engaging in such other activities as may be deemed expedient. The Society has no branches but is itself affiliated with the American Association for the Advancement of Science.

The annual meetings of the Society have been held during the spring in various eastern cities the last one being held May 20-24, 1930, at the American Museum of Natural History in New York City.

Four types of membership are maintained, namely, honorary, patron, life and active. There is one honorary member. Life membership numbers sixty and active membership approximately one thousand. The annual dues including subscription to the Journal of Mammalogy are $3.00.

The Journal of Mammalogy, the official publication of the Society, is an illustrated quarterly totalling for the year about 400 pages devoted to all branches of mammalogy, both popular and technical. Subscription to non-members is $4.00 a year.

The Society has sponsored the publication by the Williams and Wilkins Company of a series of monographs which appear at irregular intervals. These are as follows: 1. "Anatomy of the Woodrat," A. Brazier Howell, 1926, $5.00; 2. "The Beaver; Its Work and Ways," E. R. Warren, 1927, $3.00; 3. "Animal Life of the Carlsbad Cavern," Vernon Bailey, 1928, $3.00.

The Society has initiated a movement for adequate conservation of whales. This is now being prosecuted and there are additional activities directed towards promoting the conservation of mammals in general.

The Society has a small endowment in the form of $15,000.00 invested funds.

The National Office is at the Department of Anatomy of Johns Hopkins Medical School, Baltimore, Maryland.

The present national officers include the following: President, Dr. Witmer Stone, Academy of Natural Sciences, Philadelphia; Vice-Presidents, Dr. T. S. Palmer and Dr. M. W. Lyon, Jr.; Corresponding Secretary, A. Brazier Howell, and Editor, Edward A. Preble of the Biological Survey in Washington.

AMERICAN ORNITHOLOGISTS' UNION

T. S. Palmer, Secretary

The American Ornithologists' Union popularly spoken of as the "A. O. U." was founded in 1883 and incorporated in 1888. It has as a purpose that of increasing and disseminating knowledge of birds. It has no branches and no affiliations.

The recent annual meetings have been held as follows: Washington, D. C., 1927; Charleston, South Carolina, 1928; Philadelphia, Pennsylvania, 1929 and Salem, Massachusetts, 1930.

The total membership of 2000 persons includes fellows, retired fellows, honorary fellows, corresponding fellows, members and associates. Members must show an interest in birds and be recommended by a member of the Union. The dues of associates are $3.00 a year, of fellows, $5.00 and of members, $4.00.

The Union has as its official organ, *The Auk,* a quarterly journal totalling about 600 pages a year. In 1929, the Union published an index covering ten years of *The Auk* from 1911 to 1920. It is concerned also with a revised check list of North American birds.

The Union has an endowment of about $30,000 and maintains a national headquarters at 1939 Biltmore Street, N. W., Washington, D. C.

The chief officers at present are: President, Dr. Joseph Grinnell, Museum of Vertebrate Zoology, Berkeley, California; Secretary, Dr. T. S. Palmer, Washington, D. C.

THE UNITED STATES BUREAU OF BIOLOGICAL SURVEY

Those interested in obtaining a complete account of the history and activities of the Bureau of Biological Survey should be referred to Service Monograph of the United States Government No. 54, " The Bureau of Biological Survey, Its History, Activities, and Organization," by Jenks Cameron, published in 1929 by the Institute for Government Research of the Brookings Institution. This 339-page book gives a thorough account of the Bureau, with summaries of changes in ideals and practices that have taken place since its inception, and may be purchased from the Johns Hopkins Press, Baltimore, Md.

The agency that is now the Bureau of Biological Survey was established on July 1, 1885, as a Section of Economic Ornithology of the then Division of Entomology of the United States Department of Agriculture. A year later it was made an independent Division of Economic Ornithology and Mammalogy, and in 1896 its name was changed to the Division of Biological Survey. The division was made a bureau of the department in 1905. It was assisted greatly in its earlier activities by the older American Ornithologists' Union, a non-governmental organization, and that friendly cooperation has continued close. The Bureau later, along with its other scientific research, developed the studies of economic relationships of wild life and occupies a leading position in this field.

The Chiefs of the Bureau have been Dr. C. Hart Merriam (1885-1910), Henry W. Henshaw (1910-1916), Dr. Edward W. Nelson (1916-1927), and Paul G. Redington (1927——). During the life of the Bureau there has been abundant evidence of cooperative spirit between the purely scientific agencies and this governmental unit.

The six divisions—Biological Investigations, Food Habits Research, Fur Resources, Predatory-Animal and Rodent Control, Game and Bird Conservation, and Land Acquisition—make up the present Bureau of Biological Survey. The duties are varied in their character, being scientific, educational, social, and economic. In each case the influence must be and is nation wide. Some idea of the support given the Bureau may be gathered from the fact that the appropriation for the Biological Survey for the fiscal year 1930 was more than $1,500,000. A cross section of the activities of the Bureau is shown when it is mentioned that this appropriation was used for biological investigations of the life habits, distribution, and migration of North American wild life; for studies of the food habits of birds, mammals, reptiles, and amphibians; for surveys of the food resources of migratory wild fowl; for the introduction, attraction, and propagation of birds; for the control of injurious birds, predatory animals, and rodents and the suppression of rabies; for investigations in the methods of producing fur-bearing animals on fur farms; for the protection of migratory birds, including the maintenance of a force of twenty-five United States game protectors; for studies of reindeer, game, and fur-bearing animals in Alaska and for the activities of the Alaska Game Commission; for the maintenance of eighty-five mammal and bird reservations and for inauguration of operations under the Migratory-Bird Conservation Act of February 18, 1929, under which a nation-wide system of migratory bird refuges were authorized to be established over a ten-year period; and for the general administration expenses of the Bureau.

According to Paul G. Redington, the attitude of the Biological Survey of which he is the Chief is three-fold: It stands for wise and well-coordinated conservation and, along with it, economic utilization and reasonable control of the wild-life resources of the country.

The services to nature education by the Biological Survey are so many that they cannot be enumerated here. Instead, reference is made to the more complete account already cited.

CONSERVATION AND FISH AND GAME COMMISSIONS

Commissions charged with responsibility in conserving fish and game are to be found in most of the states. Some of these recognize their function as being strongly educational. Others are more strongly political and legislative in their nature. Where conspicuous work in nature education is being effectively prosecuted by the state commissions, this is being cited in the accounts of activities in the various states.

The manner by which the various commissions are supported financially, choose their personnel and maintain their public relations varies considerably. Some have recognized the value of research as an accompaniment to a legislative program but this has not been universal nor have the research findings always been reflected in the legislative program. Some commissions have published materials of value to science in general while others have considered primarily the interests of those interested in killing living things.

One of the most effective commissions is the California Fish and Game Commission. It is therefore selected as representative of the better type and a brief report is given based upon data supplied by Dr. Harold Bryant, formerly in charge of the commission's Bureau of Education and Research.

CALIFORNIA FISH AND GAME COMMISSION

The California Fish and Game Commission was founded in 1870. Its purpose was "to enforce laws protecting fish and game; establish and maintain fish hatcheries and stock streams; furnish plans for construction of fish ladders; propagate game birds or animals and release same; investigate disease problems and other scientific projects; establish game refuges."

While the main office is at 510 Russ Building, San Francisco, California, branches are maintained in various parts of the State. These are at Los Angeles, Monterey, Sacramento, San Diego and Eureka.

The commission is state supported and does not maintain memberships in the sense that various societies do. No charge is made for the publications of the commission. Some of these periodicals appear at regularly stated intervals while others are decidedly irregular. *California Fish and Game* appears regularly as a quarterly and provides articles of a popular and scientific nature dealing with the wild life of the State. At times, certain numbers have been devoted specifically to limited groups of living things. There was for example a "hawk number," a "trout number" and so on. The commission also publishes a *Biennial Report, Fish Bulletins, Fish Circulars,* (yearly), *Teachers' Bulletins* and *Miscellaneous Leaflets.*

The commission maintains a Bureau of Research and Education wherein lecture schedules are made up for the districts of the state and covered by a lecturer. These itineraries include schools, service clubs, fish and game protective associations and like organizations. In 1928, the commission maintained for one week a Boy Scout Conservation Training Camp at Yosemite National Park. There is also definitely organized summer resort educational work carried on in Yosemite and in California State Redwood Park.

Research activities of the California Fish and Game Commission have dealt with the life histories and habits of quail, meadowlarks, owls and many other species of birds. Special studies have been made of disease problems affecting fish and game and special work has been done in recent years in connection with the feeding of young fishes in the centers where they are propagated. At present, a study is being made of the activities of predatory animals and of the causes of and means of protection from the diseases of wild ducks.

The lecture program sponsored by the commission serves in a sense as leadership training. An Eagle Scout Conservation Training Camp was conducted at Camp Yosemite, August 5 to 15, 1930, at which practically the entire activity was along the lines of nature education.

The California commission actually owns one water-fowl sanctuary of 3,000 acres and over thirty other smaller refuges. It also owns and operates twenty-eight fish hatcheries in different parts of the state.

Visual education equipment owned and loaned by the commission without a rental fee to schools and reliable organizations include a standard movie projector, a stereopticon, three 16 mm. moving picture films, forty standard moving picture films and over five hundred lantern slides.

The commission cooperates with the activities in nature education carried on at the national parks within the boundaries of the state and to this end one should read the account of the Yosemite School of Field Natural History.

The Bureau of Education and Research is technically a part of the Division of Fish and Game of the Department of Natural Resources of the State of California. The activities of the larger unit are slightly more comprehensive and may be summed up as follows:

The Division of Fish and Game has stewardship of the hunting and fishing attractions of California. It is making a serious effort to conserve and restore wild life resources. It is confronted with difficult problems. Among the most perplexing is the maintenance of fish and game in the face of a thriving civilization, which is rapidly changing and modifying the natural environment and at the same time taking a large toll.

During the past ten years, the number of license holders has doubled. Nor does the mounting numbers of those who consider fishing and hunting their favorite sport hold any promise of waning. Already over half a million citizens find abundant recreation and exhilarating pleasure in pursuits with rod and gun. Contacts with the out-of-doors enable them to live more wholesome lives; to find relief from what Herbert Hoover calls " the drabness of civilization."

To insure for the future an adequate supply of fish and game and to offset the manifold possibilities of depletion through unwise use, the Division is employing methods which past experience and scientific knowledge prove fundamental.

In order to afford natural food, shelter and safety to game species, hunting has been prohibited on over 2,500,000 acres of existing remnants of primitive area. Game refuges number nearly forty. Reclamation, drainage and evaporation are responsible for the reduction of at least 80 per cent of water areas formerly eminently suited as loafing and feeding grounds for myriads of waterfowl. A survey now being conducted will result in the purchase and establishment from allotted funds of additional refuges and public shooting grounds and the great improvement of these conditions.

The Division keeps an actual record of the number of deer legally killed. It knows that 21,515 deer were killed in the season of 1928 and that this was 2,008 more deer than were killed in 1927. It also knows the number of fur bearers taken by trappers. Data as to the catch of food fish is required by law. Such statistics are of great value. If records show that a species suffers progressive diminution from year to year, depletion has set in and proper steps can be taken to avert further impairment. Ability to detect when the breeding stock of a particular species is being depleted is fundamental in the control and regulation of hunting and fishing.

To enforce effectively the fish and game laws, the Division must maintain a policy of constant watchfulness. About 120 regular deputies and over 850 volunteer wardens patrol some 150,000 square miles of mountains and valleys where hunting is permitted and thousands of miles of fishing streams and lakes. For the biennial period of 1926-1928, nearly $150,000 was collected as fines and forfeitures for violations of the law. Jail sentences totaling 8,504 days were served by violators. To attest the increasing vigilance of deputies, records show that in 26 years the number of arrests and convictions has increased from 550 to 4,390 biennially. Launches and speed boats of the Division patrol the principal bays and rivers. A force of commercial fisheries deputies watches the coast and ocean waters.

Experience has proven that the strong arm of the law is necessary to curb the activities of those who know no conscience in killing game. Fines and punishments, however, are not the only remedies that may be applied. Under the proper stimulation, minds open to enlightenment can form a fixed respect for the higher values of wild life. Consequently, an educational program has been instituted. Lecturers representing the Division make personal contacts with schools and colleges, service clubs and lodges, conservation and protective organizations in every section of the state. Cameramen experienced in wild life photography are employed to make motion pictures which win more sympathetic appreciation of the need and value of conservation work.

San Pedro and Monterey are among the largest fishing ports in the United States and efforts to regulate the traffic in fish are not without their trials. The magnitude of this work is apparent when it is known that during 1928 the amount of fresh fish and shellfish caught in the state and along the California coast totaled 528,481,044 pounds. This is the largest commercial fish catch ever recorded in California and is greater than that of any other state. In this same year the wholesale value of the fishery products was over thirty millions of dollars.

The Division maintains a laboratory at San Pedro for research on marine fishes. Here most advanced types of investigation are conducted. A knowledge of the abundance, breeding grounds and lives of fishes of commercial importance is of two-fold value. It serves as a practical aid to the commercial fishing and canning industry and also furnishes data useful in framing legislation.

The engineer, as well as the scientist, contributes to the work of the Division. Fish ladders are constructed where dams would otherwise remain insurmountable barriers and migratory fish are thus enabled to reach their spawning grounds. Fish screens are installed on diversions from rivers and streams to prevent fish from entering pumps, ditches and canals and thus becoming lost. Pollution is also an engineering problem. Oil pollution has a decidedly deleterious effect on fish life, and even kills birds. In many cases, elaborate and costly devices have been installed to safeguard against this menace.

Wherever possible, the Division is making a constructive effort to artificially assist nature to increase her reproductive capacity. Increased revenue has permitted the construction of eleven new fish hatcheries and stations in three years. Two permanent hatcheries replaced temporary structures. All are located at strategic places remote from existing hatcheries and should improve the waters adjacent to them. Now twenty-six hatcheries and twelve egg-collecting stations supply trout for 26,000 miles of fishing streams and 10,000 lakes. The Mt. Shasta Hatchery is the largest trout hatchery in the world. With fifty-two brood ponds and five hatchery buildings, it is equipped to handle alone over 10,000,000 trout a year. The total output for all the hatcheries for the past biennium was 51,444,562 trout and 26,728,590 salmon.

Chinese ring-necked pheasants are now found in practically every part of the state where climate and topography permit their continuance. In 1926, at Yountville, Napa County, the Division established one of the largest single under-wire enclosures of its kind. At this game farm, pheasants, quail, partridges and other game birds are artificially produced. In 1926, plants were made of 3,420 Chinese ring-necked pheasants. A second game farm constructed in the summer of 1929 in southern California will soon produce many more thousands of pheasants.

All the work of the Division in conserving and restoring fish and game resources is not supported by taxation, but solely by hunting and angling licenses, fines imposed by the courts for violations of the fish and game laws, and the licenses paid by trappers, deer hunters, game and fish breeders, commercial hunting club operators and commercial fishermen and privilege taxes paid by fish canners.

It is evident by the foregoing that the Division is making earnest effort to fulfill the duties wisely imposed by law. By placing emphasis on protection, law enforcement, artificial reproduction, education and scientific research, it is making sure a future for fish and game resources.

ZOOLOGICAL PARKS

Claude W. Leister, Curator of Educational Activities, New York Zoological Park

The zoological parks of the United States are important factors in their communities for the advancement of nature education. Their effect is extremely far reaching, for their appeal is universal. Everyone goes to the zoo. Without the zoological park, children living in our great cities would be seriously handicapped in obtaining essential knowledge of animal life.

The following account mentions in particular the efforts being made by the New York Zoological Park to encourage and aid the study of natural history subjects in the public and high schools of the city. The working plan of the park organization is also given in brief and will be found more or less similar to that of other parks.

The New York Zoological Society was chartered in 1895 " to establish a public zoological park; to preserve our native wild animals and to promote the science of zoology." All other Zoological Societies in establishing zoological parks had much the same ideals which they sought to carry out. Thus the Zoological Society of St. Louis, incorporated in 1914, seeks (1) " To establish, maintain and control, and to cooperate with the city of St. Louis in establishing, maintaining and controlling suitable zoological parks, gardens, collections and exhibits for the promotion of zoology and kindred subjects, and for the instruction and recreation of the people, and particularly for the children of St. Louis. (2) To exhibit wild animals under favorable conditions. (3) To increase public interest in wild animals. (4) To procure better protection of wild animal life by educational methods."

The aims and purposes of the San Diego Zoological Society are very similar to the above. (1) " To exhibit wild animals, birds and reptiles for educational purposes." (2) Public instruction. (3) Conservation of wild life. (4) Study of diseases of animals. (5) Recreation and entertainment.

Thus the ideals of the founders of our zoological parks are very similar and differ principally in results obtained. The maintenance and development of a zoological park is a hazardous enterprise and, in the early stages of the project at least, there are many political and other pitfalls to be avoided if an ultimate degree of success is to be achieved..

In so far as administration is concerned, our zoological parks are of three types,—those operated by private societies or organizations, by municipal bodies and by park departments. Most of the larger zoological parks are operated by Zoological Societies, incorporated under the laws of their respective states. The organization of the New York Zoological Society, which also operates the New York Aquarium and functions by right of a special charter granted by the state of New York, is of this type. The Society has over two thousand members. The affairs of the Society are controlled by a Board of Managers (thirty-six persons). The active planning and work of the Society is in charge of the Executive Committee (eight members), chosen by the Board of Managers from their number. The chief executive officer of the Park is the director. The general administrative officer is the chief clerk, and the curators of the departments of birds, mammals, reptiles and educational activities are responsible for their respective departments. Practically all of the society-operated parks are managed in much the same manner.

Privately owned and operated zoological parks of course have a different plan of management, and those operated in connection with municipal parks are usually under the direct supervision of a special committee.

Practically all of the zoological parks receive a maintenance fund from the city in which they are located. Thus the New York Zoological Society receives funds from the city " for the maintenance of the Zoological Park, but such appropriations are not available for the purchase of animals or other exhibits, for the carrying on of field work, or for the publications of its scientific research organizations. The funds for these purposes are derived from the income of invested endowments and from contributions of friends and members of the Society."

The oldest Zoological Society in the United States is the Philadelphia Zoological Society, incorporated in 1859, and which established the Zoological Gardens in 1876. The Cincinnati Zoological

Garden was established one year earlier, in 1875. This latter organization has been privately operated since its beginning and today is the most notable of our privately owned and operated zoos. The National Zoological Park, in Rock Creek Park at Washington, has been controlled by the Smithsonian Institution since 1890. Its finances are dependent upon the whims of Congress.

The first zoological park that we apparently have a record of was maintained in China by one of the ancient emperors. Its name " Intelligence Park " seems to indicate that its educational value was well recognized. In later years we find many animals kept in captivity under the Romans, but the principal function of their collections seems to have been to furnish animals for the arena. Since then the modern zoo has gradually evolved and there are many fine animal collections in the country today. And like the Chinese of old, we are realizing more and more the educational possibilities of these zoological parks.

Practically all of our zoological parks, not too actively contending with growing pains, are making considerable effort to increase the educational worth of their institutions. It is generally recognized that the most important function of the zoo today is that of public education. Due to their different organization, our zoological parks are working out this problem in various ways.

In Philadelphia the Zoological Garden receives no financial support from the city with the exception of $50,000. In return for this sum it is specified that the inmates of all charitable institutions are to be admitted free, and two hundred thousand tickets are given to the Board of Education so that school children may also be admitted free of charge.

In San Diego, California, docent or experienced guide service is furnished to groups of school children coming to the park. In addition these groups are carried to and from the schools by buses owned and operated by the park. This is made possible through a special endowment fund.

At the New York Zoological Park twenty-seven thousand school children visited the Park in groups, with their teachers, in 1929. The work of furthering the Park's activities with these and other school groups is under the supervision of a curator of educational activities. On pay days (Mondays and Thursdays), groups of school children are admitted free of charge. Docent or experienced guide service is extended to the other groups and many of the younger ones.

Contact is maintained with principals and teachers of the public schools, and from time to time items of interest concerning the Park are conveyed to them. Visits to the Park by school groups are thus greatly encouraged.

Illustrated charts for the use of teachers and older students are being prepared in order that greater benefit may be derived from the animals in the Park collections. These charts stress the animal's place in nature, its habitat and relation to man. In addition to the extensive system of labeling in the Park there are also numerous conspicuous charts showing the relation and geographic distribution of the different forms of animal life.

In the past a series of lectures on animal life, given during the summer months, proved to be very popular, over four thousand children attending them. It is intended that these lectures are to be continued in the future. At the New York Zoological Park present facilities for giving such talks are inadequate, and as stated by the Director of the Park in the first edition of " The Nature Almanac," an auditorium is greatly needed. It is hoped that such a building will be provided in the near future. Any zoological park having proper facilities will find that a series of talks on the animals in the park will prove to be very popular, and if given in the summer vacation months will be greatly appreciated by the many children who have not been able to leave the city for the farm, camp or seashore.

" In cooperation with the Board of Education, a series of mammals, birds and reptiles are on deposit in several of the high schools of the city. These animals remain as permanent exhibits during the school year in the zoological rooms of the schools. The schools have their own attendants to look after the collections but a veteran keeper of the Zoological Park staff makes weekly inspections and furnishes expert advice on the care of animals."

Motion pictures have proved to be an especially valuable aid to the study of natural history. In this connection the New York Zoological Society maintains a collection of motion picture films in excess of forty thousand feet on "Living Natural History," dealing with the various orders of animal life. These films may be borrowed free of charge by the various elementary and secondary schools of the city.

Lantern slide talks, illustrated by correctly colored slides, are being prepared for the various animal groups and animals in the Park. They likewise may be used without charge by the schools and other organizations of the city.

During the course of a year members of the Park staff are called upon to give talks and lectures concerning the many activities of the Park. Every effort is made to satisfy requests of this nature, for such talks are an important means of disseminating knowledge concerning the Park and creating and sustaining interest in the work of the institution.

A directory of the various zoological parks, zoological gardens and zoos in the United States follows:

ZOOLOGICAL PARKS AND GARDENS IN THE UNITED STATES

Managed by Zoological Societies

California: San Diego, Balboa Park, Zoological Society of San Diego, Dr. Harry Wegefarth, President, Mrs. Belle Benchley, Executive Secretary.

Illinois: Chicago, Chicago Zoological Park, Chicago Zoological Society, John T. McCutcheon, President, The Chicago Club, Edward H. Bean, Director.

Louisiana: New Orleans, New Orleans Zoological Society, Dr. William Scheppergrell, President, Frank E. Neelis, Superintendent, Audubon Building.

Michigan: Detroit, Detroit Zoological Park, Zoological Park Commission, John T. Millen, Director.

Missouri: St. Louis, Zoological Society of St. Louis, Henry C. Muskopt, Secretary, 662 Security Building, George P. Vierheller, Superintendent.

New York: New York City, New York Zoological Park, New York Zoological Society, Dr. W. Reid Blair, Director.

Ohio: Cincinnati, Zoological Park Association, S. A. Stephan, General Manager.

Ohio: Toledo, Toledo Zoological Society, Percy C. Jones, President, 1600 Nicholas Building, Toledo, Ohio.

Pennsylvania: Philadelphia, Philadelphia Zoological Gardens, Fairmount Park, Zoological Society of Philadelphia, C. Emerson Brown, Director.

Wisconsin: Milwaukee, Washington Park Zoo, Washington Park Zoological Society, Edmund Heller, Director.

OTHER ZOOLOGICAL PARKS AND MUNICIPAL ZOOS IN PARKS

Alabama: Birmingham.

Arkansas: Hot Springs.

California: Los Angeles, Eastlake Park; Sacramento; San Francisco, Golden Gate Park Zoo.

Colorado: Colorado Springs; Denver, City Park Zoo, C. E. Hill, Superintendent; Pueblo, City Park.

Connecticut: Hartford.

District of Columbia: Washington, National Zoological Park, Dr. W. M. Mann, Director.

Florida: Cocoa, Cocoa Zoo, L. T. Smith, Manager.

Georgia: Augusta; Atlanta, Grant Park.

Indiana: East Chicago; Lafayette; Muncie.

Illinois: Bloomington; Chicago, Lincoln Park Zoo, Alfred E. Parker, Director; Rockford.

Iowa: Cedar Rapids, City Park; Council Bluff; Davenport; Des Moines, Grandview Park; Iowa City; Iowa Falls; Sioux City.

Kansas: McPherson; Topeka; Wichita, Riverside Park.

Kentucky: Owensboro.

Louisiana: Baton Rouge.

Maine: Bangor.
Maryland: Baltimore.
Massachusetts: Auburndale, Norumba Park; Boston, Boston Zoological Park, Franklin Park, Daniel J. Haskins, Superintendent; Springfield, Forest Park.
Michigan: Detroit, (Belle Isle), Board of Park Commissioners; Flint; Grand Rapids; Jackson; Petoskey.
Minnesota: Duluth; Hibbing; Minneapolis, Longfellow Zoological Gardens, Robert F. Jones, Proprietor; St. Paul.
Mississippi: Jackson.
Missouri: Joplin; Kansas City, Swope Park; Springfield; St. Joseph, Krug Park.
Montana: Butte.
Nebraska: Lincoln; Omaha, Riverside Park.
New Jersey: Trenton.
New York: Buffalo, Buffalo Zoo, Washington Park, Dr. F. A. Crandall, Curator; Elmira; Rochester, C. C. Laney, Superintendent of Parks; Troy; Utica, Edward M. Swiggett, Superintendent of Parks.
North Carolina: Winston-Salem.
North Dakota: Minot.
Ohio: Cleveland, Brookside Park, Wade Park.
Oregon: Portland.
Pennsylvania: Pittsburgh, Bureau of Parks; Reading, Scranton.
Rhode Island: Providence, Roger Williams Park, William Bryant, Director.
South Dakota: Sioux Falls.
Tennessee: Memphis, Overton Park Zoo; Nashville.
Texas: Austin; Dallas, W. F. Jacoby, Director of Parks; El Paso; Fort Worth; Houston, Clarence L. Brock, Superintendent of Zoo; San Antonio; Wichita Falls.
Utah: Salt Lake City, Liberty Park.
Washington: Seattle, Woodland Park; Spokane, Manito Park; Tacoma, Fort Defiance Park.
West Virginia: Charleston.
Wisconsin: Madison; Racine.
Wyoming: Sheridan.

EDUCATIONAL ACTIVITIES OF BOTANICAL GARDENS *

Originally botanical gardens were designed for the purpose of the demonstration of medicinal plants. Later, horticultural plants were included but in each case the function of the garden was largely educational. While these two functions have persisted through the years, they have had to share support with activities relative to the discovery of new facts about plants. The term botanical institute is replacing the older term botanical garden in many places largely because it more accurately describes the activity of the organization involved.

The educational activities of the modern botanical garden or botanical institute extend to every class of persons with the greater emphasis being placed on meeting the needs of persons of the immediate community. The educational activities may be roughly classified to include the following types.

Involuntary education is effected through the experience of persons visiting displays of botanical materials which are open to an inquisitive public. This type of education is made more effective by the use of good organization and effectively planned explanatory labels. The effectiveness of this education depends in no small degree upon the persons coming in contact with its materials. If the botanical garden recognizes some obligation in connection with this type of education it satisfies it by stressing the general exhibits open to a public which may accept or reject them as suits their fancy.

A more direct type of education is carried on through lectures, publications and cooperation with organizations more definitely charged with the responsibilities of public education and with research.

The public lectures given at botanical gardens vary considerably in their formality. Some offer little or no opportunity for interchange of ideas between the speaker and the listener while others are stimulated primarily by the questions of the visiting patron.

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* Prepared by E. L. Palmer largely from data supplied by H. A. Gleason and C. Stuart Gager of the botanical gardens of New York and Brooklyn, respectively.

Public lectures often accompanied by demonstrations of living plant material are generally a regular part of the garden program generally being given at more or less regular periods and with adequate previous announcement to insure that those interested may profit most.

Personally conducted visits led by staff members are made at intervals to interesting parts of the gardens, this type of service being generally known as docent service. Those availing themselves of this service almost invariably have a mixed background of experience. In a given group, there may be children just able to toddle and old men with equal limitations. There may be visitors with a highly technical training and individuals with almost no formal training. Obviously, this type of service calls for unique teaching ability.

Other regularly recognized lecture obligations of botanical gardens center about regularly scheduled visits of individuals from schools. These may be from the elementary grades or may be classes in botany from the universities and the degree of interest and the kinds of enthusiasm may vary accordingly.

Botanical gardens frequently maintain rather specialized training activities for public school teachers who may wish to share their interests with their pupils.

Botanical gardens frequently supplement their personal service by providing materials for others to use in allied activities. Generally these are in the form of publications, small exhibits, letters, or space in which seriously concerned persons may carry on some activity concerned with the offerings of botanical gardens.

Some botanical gardens publish small journals which may be secured by individuals entitled to them. Generally these are of a popular nature though this is by no means always the case. Their periodicity also varies considerably.

Collections of botanical materials either living or preserved are available to a degree for use in schools conveniently located to botanical gardens. These are frequently accompanied by sets of lantern slides or other visual education devices which are designed to be helpful in work in geography or science in many types of schools. Space is frequently provided in botanical gardens for school gardens.

Here school children may work under the direction of skilled leaders and learn the story back of plant growth. These gardens may be out-doors or in the comforts of green houses.

Cooperation between botanical gardens and the higher institutions of learning varies. There are interlocking staffs in Washington University and the Missouri Botanical Garden which assure an exchange of courtesies and experiences with mutual profit. Where this cooperation exists to any considerable degree, excellent provision for research is provided for students of the university or college involved. Generally speaking these courtesies are extended generously to investigators of proven worth from other institutions to the end that the gardens render a service to science not necessarily of local significance.

This service to science is, on occasion, supplemented through the publication of research papers. Institutional research by botanical gardens covers all lines of botanical activity. This may be within the bounds of the garden or may be through extensive exploration. The New York Botanical Garden, for example, has done much in South America while the Arnold Arboretum has done most effective work in China. These researches have contributed to the demands of pure botany and of horticulture and have been exchanged freely between the various institutions. The New York Botanical Garden and the Kew Gardens have maintained a close relationship in their activities in pure science and have cooperated extensively along horticultural lines with such different organizations as the New York Experiment Station, the American Iris Society and a great paper manufacturing concern.

Certain of the botanical gardens have become known because of their exceptional success in one or the other of the activities common to a degree to all. Thus the New York Garden has become noted for its public lectures and for its cooperation with the graduate school of Columbia University. The Brooklyn Garden has built up a splendid reputation through its individual attention to queries and its close affiliation with the public schools. The Boyce Thompson Institute has been equally courteous and become equally famous because of its attention to independent investigators and the Missouri Botanical Garden has, as indicated previously, identified itself as a valuable cooperating agency with the undergraduate activities at Washington University. It has also become well known through its school for gardeners. Besides identifying themselves through these activities, certain botanical gardens have become well known throughout the world because of the publications they have sponsored. In this connection, one should mention *The American Journal of Botany* published by the Brooklyn Botanical Garden, *The Annals* published by the Missouri Botanical Garden and *North American Flora* published by the New York Botanical Garden.

The Brooklyn Botanical Garden may be taken as an example of a typical botanical garden of high class and the following information may have some little value in understanding the organization of others.

The Brooklyn Botanical Garden was founded in 1910 for the purpose of the " advancement and diffusion of a knowledge and love of plants." It is a department of the Brooklyn Institute of Arts and Sciences and has a formal agreement with New York University. It has a membership of over twelve hundred but during the last year has made public contacts with over 1,100,000 persons. The annual dues of members are $10. Sustaining members pay $25 and a life membership implies the payment of $2500.00.

The *American Journal of Botany* published by the garden is the official organ also of the Botanical Society of America. It appears monthly except in August and September. It totals about 650 pages for the year and has a subscription rate of $7.00. The Brooklyn Botanical Garden also publishes the quarterly journal *Ecology* which is the official organ of the Ecological Society of America. This journal totals about 550 pages for the year and has a subscription rate of $4.00 a year. *Genetics* is published bi-monthly by the garden. It totals 570 pages for the year and has a subscription rate of $6.00 a year. *Record* is a bi-monthly also published by the garden which totals for the year about 300 pages and has a subscription rate of $3.00 a year.

The Brooklyn Garden publishes a series of pamphlets for school use. These sell at $.50 a series and appear weekly or bi-weekly in the spring and fall. Other pamphlets include *Flower Games,* price

$.10 and *List of Books on Gardening and Botanical Nature Study,* price $.25.

In 1910, the Brooklyn Botanical Garden sponsored an expedition to Cuba. In 1921-22, it sent another to the Amazon Basin in Bolivia and Brazil. Another expedition from the garden went to Japan in 1929 and in the same year another went to the Galapagos Islands.

Research activities of the Brooklyn Botanical Garden have been varied and have been in the fields of plant pathology, genetics, plant physiology, ecology and systematic botany. Some of the major problems dealt with have concerned themselves with disease resistance in plants; the breeding, cultivation, nomenclature and pathology of beardless iris; the effects of radium rays on plants; the genetics of the fern genus *Nephrolepis;* the vegetation of Long Island and a number of problems in systematic botany.

The Brooklyn Garden owns and operates in its public relations one standard moving picture projector and two stereopticons. It also has approximately 5,500 lantern slides for use.

The Brooklyn Botanical Garden has its main office at 1000 Washington Avenue, Brooklyn. The Garden enjoys an endowment of over $950,000.00 and has as its director, C. Stuart Gager.

THE AMERICAN ASSOCIATION OF MUSEUMS

Laurence Vail Coleman, Director

The American Association of Museums was founded May 15-16, 1906, with the stated purpose " to promote the welfare of museums, to increase and diffuse knowledge of all matters relating to them, and to encourage helpful relations among museums and those interested in them."

There are no official branches of the organization though members hold such regional conferences as those of New England, of Ohio and Indiana and of the South. There are no definite affiliations with other organizations. Annual meetings have been held regularly since 1906, the meeting for 1930 having been at Buffalo from June 4th to 7th.

There are a variety of types of membership, these being designated by such titles as individual, institution, honorary, life, patron, benefactor. The membership totals 1004. Individual members must be persons who are engaged in museum work or who are directly interested in the object of the Association. Institution members are museums or kindred institutions. Honorary members are named from those who have become distinguished for eminent service to the cause of museums. Benefactors and patrons are named from persons who have bestowed important favors upon the Association.

The dues of individual members are $5 a year. Life members pay $100 and are freed from the further payment of dues. Institution members pay from a minimum of $10 a year to a maximum of $250, full membership being allowed at the lower level. In general, however, institution members pay dues on a sliding scale which provides for $1 of dues for each $1000 of the museum's annual operating budget. Patrons contribute $500 to the support of the activities of the Association and benefactors pay $1000 or more.

The Association publishes *The Museum News* twice a month from September to June inclusive. Each issue is eight pages in length and the periodical is now in its seventh volume. In addition, the Association is responsible for the " Publication of the American Association of Museums, New Series." It has issued, also, monographs at intervals and of varying size and price. Books published by the Association include the following none of which are directly but all of which may be indirectly concerned with nature education.

" Manual for Small Museums," Coleman, $5.00.

" A Bibliography of Museums and Museum Work," Smith, $5.00.

" Directory of Museums of South America," Coleman, $3.00.

In 1928, the Association published a pamphlet " Contributions of Museums to Outdoor Recreation." This was a report prepared by the Director at the request of the National Conference on Outdoor Recreation. It has also sponsored the publication by the H. W. Wilson Company of New York of " The Art Index."

Certain activities of the Association have been of a research nature. Some of these cover psychological studies of the behavior of the museum visitor with a view towards recommending new methods of installation and presentation to the public of museum exhibits. Some of these studies are at present being followed up and in addition a study is being made of methods of finance and accounting common in museums to determine underlying principles and worthy practices.

The National Headquarters are at the Smithsonian Institution, Washington, D. C.

The principal officers include the following: Fiske Kimball, President; Arthur C. Parker, Vice-President for History Museums; Charles R. Richards, Vice-President for Industrial Museums; Paul J. Sachs, Vice-President for Art Museums; George H. Sherwood, Vice-President for Natural History Museums; William deC. Ravenel, Secretary; George D. Pratt, Treasurer; Laurence Vail Coleman, Director.

SCIENCE MUSEUMS OF THE UNITED STATES *

The following list includes the more active museums devoted to natural history. Zoological parks and botanical gardens are not included. In addition to the college museums listed, there are hundreds of others consisting for the most part of teaching collections.

	ALABAMA	
Birmingham	Birmingham Public Library: Museum Department	H. E. Wheeler, curator
University	Geological Survey of Alabama: Alabama Museum of Natural History	Walter B. Jones, director
	ARIZONA	
Coolidge	Casa Grande National Monument Museum	Frank Pinkley, superintendent
Globe	Gila Pueblo Museum	Harold S. Gladwin, director
Flagstaff	Museum of North Arizona	Harold S. Colton, director
Grand Canyon	Grand Canyon National Park: Observation Station	Edwin D. McKee, park naturalist
Holbrook	Petrified Forest National Monument: Petrified Forest Museum	Charles J. Smith, custodian
Phoenix	Arizona Museum	Edward Spaht, curator
Tucson	Arizona State Museum	Byron Cummings, director

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* Compiled by the American Association of Museums, Washington, D. C. from data for a revised directory of museums which is now in preparation.

CALIFORNIA

Berkeley	University of California: Museum of Paleontology	W. D. Matthews, director
	Museum of Vertebrate Zoology	Joseph Grinnell, director
Mineral	Lassen Volcanic National Park: Mae Loomis Memorial Museum	L. W. Collins, superintendent
Los Angeles	Los Angeles Museum	William A. Bryan, director
	Southwest Museum	James A. B. Sherer, director
Oakland	Oakland Public Museum	Susie W. Mott, director
Pacific Grove	Pacific Grove Museum	Laura Duncan, curator Acting director
San Diego	San Diego Museum	Clinton G. Abbott, director
	San Diego Society of Natural History: Natural History Museum	
San Francisco	California Academy of Sciences: Museum, Steinhart Aquarium	Barton W. Evermann, director
San Francisco	State Division of Mines Museum	Walter W. Bradley, state mineralogist
	University of California: Anthropological Museum	Alfred L. Kroeber, curator
Santa Barbara	Santa Barbara Museum of Natural History	Ralph Hoffman, director
Sequoia National Park	Sequoia National Park: Giant Forest Museum	John R. White, superintendent
Yosemite	Yosemite National Park Museum	C. A. Harwell, park naturalist

COLORADO

Boulder	University of Colorado Museum	Junius Henderson, curator
Denver	Colorado Museum of Natural History	J. D. Figgins, director
	Colorado State Bureau of Mines: Mineral Colleclection	John T. Joyce, commissioner
Mancos	Mesa Verde National Park Museum	Jesse L. Nusbaum, archaeologist

CONNECTICUT

Greenwich	The Bruce Museum	Edward F. Bigelow, curator
Hartford	Children's Museum of Hartford	Delia I. Griffith, director
New Britain	New Britain Museum of Natural History and Art	Fannie J. Brown, curator
New Haven	Yale University: Peabody Museum of Natural History	Richard S. Lull, director

DELAWARE

Wilmington	Society of Natural History of Delaware	Harry M. Canby, president

DISTRICT OF COLUMBIA

Washington	Army Medical Museum	J. E. Ash, curator
	National Academy of Science Exhibit	Paul Brockett
	Pan-American Union Exhibit	L. S. Rowe, director
	Smithsonian Institution: United States National Museum	Alexander Wetmore, assistant secretary

FLORIDA

DeLand	Florida Natural History Museum Society	H. J. Boekelman, secretary
Gainesville	Florida State Museum	T. Van Hyning, director
Tallahassee	Florida State Geological Department Exhibit	Herman Gunter, state geologist

GEORGIA

Atlanta	Georgia State Museum	S. W. McCallie, state geologist

ILLINOIS

Chicago	Chicago Academy of Sciences	Alfred L. Bailey, director
	Field Museum of Natural History	S. C. Simms, director
	Shedd Aquarium	George F. Morse, Jr., director
	University of Chicago: Walker Museum	Edson S. Bastin, director
Elgin	Elgin Audubon Society	Katherine M. McQueen, secretary
Lewiston	Dickson's Mound Builders' Tomb	Don F. Dickson, proprietor
Springfield	Illinois State Museum	Acting chief
Urbana	University of Illinois: Museum of Natural History	Frank C. Baker, curator

INDIANA

Indianapolis	Children's Museum of Indianapolis	Arthur B. Carr, curator
	Indiana State Museum	Verne Patty, curator
Notre Dame	Notre Dame University: Museum of Natural History	Rev. Francis Wenninger, curator
Richmond	Earlham College: Joseph Moore Museum	Allen D. Hole, curator

IOWA

Davenport	Davenport Public Museum	E. K. Putnam, director
Iowa City	State University of Iowa: Museum of Natural History	Homer R. Dill, director

LOUISIANA

New Orleans	Louisiana State Museum	Robert Glenk, director

MAINE

Bar Harbor	Arcadia National Park Museum	Walter B. Smith
Augusta	Maine State Museum	George J. Stobie, commissioner
Castine	Castine Scientific Society: Wilson Museum	J. Howard Wilson, director
Gorham	Baxter Museum	Mrs. Philip P. Lewis, director
Halowell	Lowell Museum	Abby L. Eveleth, librarian
Portland	Portland Society of Natural History	Arthur H. Norton, keeper
Thomaston	Knox Museum	N. W. Lermond, curator

MARYLAND

Annapolis	Maryland Geological Survey Exhibit	Edward B. Mathews, state geologist
Baltimore	Maryland Academy of Sciences.	Francis C. Nicholson, dean

MASSACHUSETTS

Andover	Phillips Academy: Department of American Archaeology	Warren K. Moorehead, director
Boston	Boston Society of Natural History	Edward Wigglesworth, director
	Children's Museum of Boston	Mildred E. Manter, director
Cambridge	Cambridge Museum for Children	Ruth Crawford, director
	Harvard University: Museum of Comparative Zoology	Thomas Barbour, director
	Peabody Museum of Archaeology and Ethnology	Edward Reynolds, director
Fall River	Fall River Public Library: Florence Pilkington Manchester Memorial Collection	Leo R. Etzkorn, librarian
Lancaster	Thayer Museum	John E. Thayer, director
Pittsfield	Berkshire Athenaeum and Museum: Museum of Natural History and Art	Harlan H. Ballard, curator
Salem	Peabody Museum of Salem	L. W. Jenkins, in charge
South Natick	South Natick Historical, Natural History and Library Society	Ida H. Morse, curator

Springfield	The City Library Association: Museum of Natural History	Grace P. Johnson, curator
Worcester	Worcester Society of Natural History	Wendell P. Parker, treasurer

MICHIGAN

Ann Arbor	University of Michigan: Museums	Alexander G. Ruthven, director
Detroit	Detroit Children's Museum	Gertrude A. Gillmore, curator
Grand Rapids	Kent Scientific Museum	Henry L. Ward, director
Three Oaks	Chamberlain Memorial Museum	George R. Fox, director

MINNESOTA

Minneapolis	University of Minnesota: Zoological Museum	Thomas F. Roberts, director
St. Paul	St. Paul Institute	Arthur C. Coggeshall, director

MISSOURI

Jefferson City	Missouri Resources Museum	Alfred C. Burrill, curator
Kansas City	Daniel B. Dyer Museum	Edward Butts, curator
St. Joseph	The Children's Museum	Orrel M. Andrews, director
St. Louis	Educational Museum of the St. Louis Public Schools	Acting director

NEBRASKA

Agate	Cook Museum of Natural History	Harold J. Cook, owner

NEW HAMPSHIRE

Wolfboro	Libby Museum	Henry F. Libby, owner

NEW JERSEY

Newark	The Newark Museum	Beatrice Winser, director
Paterson	Paterson Museum	James F. Morton, Jr., curator
Princeton	Princeton University: Museum of Geology and Archaeology	William C. Sinclair, director
Trenton	New Jersey State Museum	Mrs. Kathryn B. Greywacz, curator

NEW MEXICO

Aztec	Aztec Ruins National Monument Museum	Johnwill Faris, custodian
Santa Fe	Laboratory of Anthropology at Santa Fe	Jesse L. Nusbaum, director
	State Museum of New Mexico	Edgar L. Hewitt, director

NEW YORK

Albany	New York State Museum	C. C. Adams, director
Bear Mountain	Palisades Interstate Park: Bear Mountain Museum	William A. Welch, superintendent
Buffalo	Buffalo Museum of Science	Chauncey J. Hamlin, president
Castile	Letchworth Park Museum	Mrs. Elizabeth G. Keeney, curator
New York City	The American Museum of Natural History	George H. Sherwood, director
	The Brooklyn Institute of Arts and Sciences:	
	The Brooklyn Museum	William H. Fox, director
	The Brooklyn Children's Museum	Anna B. Gallup, curator
	Museum of the American Indian	George G. Heye, president
	Staten Island Public Museum	Charles W. Leng, director
Poughkeepsie	Vassar Brothers Institute	Allen Frost, curator
Rochester	Rochester Museum of Arts and Sciences	Arthur C. Parker, director
	University of Rochester: Museum of Natural History	Edward J. Faylee, director
Tuxedo	The American Museum of Natural History Station for the Study, of Insects	Frank E. Lutz, curator
Yonkers	Yonkers Museum of Science and Arts	W. N. Berkeley, director

NORTH CAROLINA

Highlands	Highlands Museum of Natural History	Clark Foreman, president
Raleigh	North Carolina State Museum	H. H. Brimley, director

OHIO

Cleveland	The Cleveland Museum of Natural History	Harold L. Madison, acting director
	Cleveland School of Education:	W. M. Gregory, director
	Educational Museum of the Cleveland Public Schools	

	Western Reserve Medical School: Hamann Museum of Comparative Anatomy and Anthropology	T. Wingate Todd, director
Columbus	Ohio State Archaeological and Historical Society	H. C. Shetrone, director
Dayton	Dayton Public Library and Museum	H. W. Sanderson, curator
Oberlin	Oberlin College: Zoological and Anthropological Museum	Lynds Jones, curator

OREGON

Portland	City Free Museum	C. F. Wiegand, curator

PENNSYLVANIA

Erie	Erie Public Museum	Mrs. Katherine B. Blake, curator
Harrisburg	Pennsylvania State Museum	Boyd P. Rothrock, curator
Philadelphia	Academy of Natural Sciences of Philadelphia	Charles M. B. Cadwalader, managing director
	Wagner Free Institute of Science: Museum	Carl Boyer, curator
Pittsburgh	Carnegie Museum	Andrey Avinoff, director
Reading	Reading Public Museum and Art Gallery	Levi W. Mengel, director
Scranton	Everhart Museum	R. N. Davis, director
Wilkes-Barre	Wyoming Historical and Geological Society	Frances Dorrance, director

RHODE ISLAND

Providence	Park Museum	William L. Bryant, director

SOUTH CAROLINA

Charleston	The Charleston Museum	Laura M. Bragg, director

TENNESSEE

Harriman	Harriman Public Museum	Mrs. Daniel Denny, director
Memphis	Museum of Natural History and Industrial Arts	F. N. Fisher, chairman

TEXAS

Dallas	Texas Museum of Natural History	Acting director
Houston	Houston Museum of Natural History	Parham Haddon, curator
San Antonio	Scientific Society of San Antonio: Museum	Edward W. Heusinger, director
	Witte Memorial Museum	Ellen D. Schulz, director

VERMONT

St. Johnsbury	The Fairbanks Museum of Natural Science	Mabel A. Shields, curator

VIRGINIA

Richmond	Department of Agriculture and Immigration:	George W. Koiner, commissioner
	State Museum	
	Valentine Museum	Laura M. Bragg, director

WASHINGTON

Port Angeles	Klahane Museum	E. B. Webster, director
Seattle	University of Washington:	
	State Museum	Acting director
Tacoma	Ferry Museum of Tacoma	W. P. Bonney, secretary

WEST VIRGINIA

Wheeling	Oglebay Park Museum	John W. Handlan, director

WISCONSIN

Beloit	Beloit College: Logan Museum	George L. Collie, curator
Milkwaukee	Milwaukee Public Museum	Samuel A. Barrett, director
New London	New London Public Museum	Francis S. Dayton, curator
Oshkosh	Oshkosh Public Museum	Nile J. Behncke, curator

WYOMING

Yellowstone Park	Yellowstone National Park Museums: Yellowstone Museum, Mammoth, Trailside, Madison Junction Trailside, Norris Geyser Basin Trailside, Old Faithful	Roger W. Toll, superintendent

THE NATIONAL PARKS ASSOCIATION *

The National Parks Association is quite a different organization from the National Parks Service, and should not be confused with it. It was founded in May, 1919, for the purpose of promoting the educational and inspirational uses of the parks, of protecting the National Park standards against attack, and of representing the people in the development and best uses of the System. As Stephen Mather, former director of the Service, remarked to Robert Sterling Yard in the days when the National Parks Association was first being

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* Prepared by A. Louise Steger from materials submitted by the Association.

conceived: " With you working outside the government, and with me working inside, together we ought to make the National Park System very useful to the country."

Robert Sterling Yard, present executive secretary of the Association, has expressed very adequately the general situation which this organization faces, in the following statement:

" If private companies should seek to mine clay in Central Park, New York City, graze sheep and cattle in Chicago's famous parks, or develop water power in Adirondack rivers, public outcry would be deafening. But because national parks are so remote, widely separated, and great in size, propositions like these attract little attention, and politicians in Congress are always anxious to oblige wealthy constituents. The government cannot fight these issues in Congress when advocated by Congressmen, so this responsibility devolves on citizens. One of the numerous duties of the National Parks Association is to defend and protect our national parks in the interest of the people of the country.

"Another danger arises from desire of local districts to have national parks of their own, either for pride's sake or to advertise their real estate and attract profitable crowds. The damage that parks below scenic standard would do to the system is at once apparent; the value of the title, like that of any other trademark, would immediately disappear. For political reasons the government also finds it most embarrassing to refuse admission to the system of areas of this kind which are backed by strong local demand; so that duty also devolves upon the people. You will perceive the great public need for the National Parks Association which is the people's voice and hand."

By means of the National Parks Bulletins issued from three to twelve times a year, and through news circulars issued from twelve to twenty-four times a year, depending upon the need for them, the National Parks Association seeks to advise the people of the policies of the Association in the maintenance of the Park standards, and to inform them of the educational and recreational developments that have occurred or are being planned within the various parks.

In the accomplishment of its purposes, the Association keeps in touch with various federations, leagues, associations and clubs of many kinds in all parts of the country, informing them of the Congressional and national situation, and these units, acting on their own initiative, cooperate in securing the desired objective. Such organizations as the National Conference on Outdoor Recreation, the directors of the General Federation of Women's Clubs, the American Association for the Advancement of Science, the National Chamber of Commerce, the Conservation Council of Chicago, and scores of others, have passed resolutions acting with the National Park Association in the defense of the Park System. In such a capacity, the Association has been the moving force behind numerous important developments beneficial to the parks both individually and collectively.

An Advisory Board on the Educational and Inspirational Uses of the National Parks was organized and placed under the chairmanship of Dr. John C. Merriam. To effectuate the plans suggested by this committee, the last Congress appropriated money for the establishment of an educational department in Washington under the charge of Harold C. Bryant, who began activities on July 1, 1930.

The protection of our national parks against commercial interests, and the upholding of the scenic standards have been difficult tasks, and the success of the Association in accomplishing them through the manipulation of public interest and sentiment, indicates the value of such an organization.

The officers of the National Parks Association are: President, George Bird Grinnell; First Vice-President, William P. Wharton; Executive Secretary, Robert Sterling Yard, 1512 H St., N. W., Washington, D. C.; Treasurer, Corcoran Thom.

The National Headquarters are at 1512 H St., N. W., Washington, D. C.

THE NATIONAL PARK SERVICE *

In 1917, the National Park Service was established as an independent bureau of the Department of the Interior. Stephen T. Mather, its former Director, whose unfortunate death occurred in January, 1930, summarized the activities of this organization as follows:

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* Prepared by A. Louise Steger from materials submitted by the Service.

" When the National Park Service first assumed the administration of our national parks its main concern was the protection of their natural features from damage of any kind, while at the same time encouraging their use by the American people. This involved the development of adequate protective forces and the installation or improvement of facilities for the accommodation of visitors. As the number of visitors increased, greater responsibilities confronted the Government in providing sanitary accommodations, developing public camps, and constructing roads and trails.

"After having built up an organization sufficient to carry on this work, another responsibility faced the National Park Service. Park visitors were not satisfied merely to view the wonderful scenic features that lay before them; they began to ask the why and wherefore of the canyons thousands of feet deep, of the geysers, hot springs, and glacial formations. So the next task before the Service was the interpreting of the natural features of the parks to the visitors.

" The first step in this new endeavor was the inauguration of nature guide service in Yosemite National Park in 1920. The nature guides, usually recruited from the staffs of colleges or other educational institutions, led parties into the field for hikes of varying lengths, during which the natural objects, both animate and inanimate, encountered along the way were explained in simple, non-technical terms. This service met with immediate success, and was extended to the majority of the other parks. The nature guide trips were supplemented by lectures on the history and natural features of the park, and these have grown in popularity along with the field trips. The talks are given around the evening campfires and at the hotels, camps, and museums by members of the park personnel, and sometimes by visiting scientists. Hundreds of thousands of people are reached in this way during the course of the summer.

"An interesting outgrowth of the nature guide service was the establishment of the Yosemite Field School of Natural History, which is now in its sixth year. This school is a contribution to nature education made possible through a cooperative arrangement between the National Park Service and the California Fish and Game Commission, and no tuition is charged. The membership in the past has been limited to twenty. The work of the field school, which is of university grade, is planned to supplement the lower division university courses in botany and zoology, and to bring students into first-hand contact with the various living forms of the region. Each student attending the field school is given practice in teaching, conducting parties out into the field, giving camp-fire talks, and preparing nature notes. Excellent lecture rooms and other facilities for the school are available in the museum building." It is interesting to note at this point, that, according to a recent letter from Mr. Ansel F. Hall, fully three-fourths of the twenty yearly graduates have entered the broader field of nature education rather than the program conducted under the Park Service.

" The newest development in interpreting nature in the national parks is the establishment of museums, in which are housed sufficient specimens illustrative of the life and geologic history of the region to catch the imagination and inspire a desire to go out into the field and study at first hand the natural features depicted by the museum specimens. Model museums have been established at Yosemite and Mesa Verde through the cooperation of private individuals or organizations and assistance is being given at the present time to the establishment of some small trail-side museums. In several of the national parks existing, buildings have been utilized for the housing of museum exhibits, and in others temporary structures and even tents are serving this purpose. At the present time, museum collections of some type are available for the inspection of visitors in Yosemite, Mesa Verde, Yellowstone, Mount Rainier, Zion, Sequoia, Rocky Mountain, Glacier, Grand Canyon and Lafayette National Parks. This field is a wide one and considerable expansion of museum facilities is expected to take place within the next few years."

The great interest shown by visitors to Yosemite in the nature guide service conducted by Drs. Harold Bryant and Loye Miller in 1920, indicated the educational value of such a program. This activity included lectures, camp fire talks and walks afield for both adults and children. From this inception the educational program so expanded that on July 1, 1924, Ansel F. Hall was appointed Chief Park Naturalist of the Service, his duties being to direct the expansion of educational activities in the parks and coordinate the work of the various park naturalists. Nature guide service is now available in most of our national parks.

At present, in addition to the general information service rendered in the parks, some of them offer the use of park libraries, the sale of park publications both governmental and general, publications by the educational staff such as " Nature Notes "—a mimeographed wild-life bulletin distributed weekly or monthly to individuals and newspapers, and containing scientific information in a form comprehensive to the public in general. The bulletin " Plants of Glacier National Park " published in 1927, is an example of a very excellent popular treatment put out by the Park Service rendering scientific botanical information available to the public in an understandable fashion.

One of the most important educational features sponsored by the Park Service is the " nature trail "—to help the visitor become acquainted with the wild life about him. Features of interest are labeled in such a way as to stimulate the person to discover facts for himself. This has proved a very successful and appealing method of nature education in several of the parks.

On July 1, 1930, a new branch of education and research in the Service was established. It is under the direction of Dr. Harold C. Bryant, whose official title in this capacity is " Assistant Director," and whose headquarters are in Washington, D. C. He is responsible for the development of the national park and monument educational programs, which include, according to information received from Mr. Demaray, " the devising and direction of methods for the securing and compilation of data on the scientific features of the national parks and monuments, including their geology, flora and fauna, and other natural phenomena; and for the interpretation of these features in terms understandable to the layman and the dissemination of this information to the visiting public. It includes also the direction of museum activities and the development and application of policies of wild life administration. Also the direction of contact and cooperation with schools, museums, and scientific and other organizations, and of the preparation of monographs on educational features of the parks."

Following is a list of the officers in the Washington office of the Service: Horace M. Albright, Director; Arno B. Cammerer, Associate Director; A. E. Demaray, Senior Assistant Director; G. A. Moskey, Assistant Director; W. B. Lewis, Assistant Director; Harold C. Bryant, Assistant Director; R. M. Holmes, Chief Clerk; Isabelle F. Story, Editor.

LIST OF FREE PUBLICATIONS DISTRIBUTED BY THE NATIONAL PARK SERVICE

CIRCULARS OF GENERAL INFORMATION FOR THE FOLLOWING:

- Acadia National Park, Maine
- Crater Lake National Park, Oregon
- Glacier National Park, Montana
- Grand Canyon National Park, Arizona
- Grand Teton National Park, Wyoming
- Hawaii National Park, Territory of Hawaii
- Hot Springs National Park, Arkansas
- Lassen Volcanic National Park, California
- Mesa Verde National Park, Colorado
- Mount McKinley National Park, Alaska
- Mount Rainier National Park, Washington
- Rocky Mountain National Park, Colorado
- Sequoia and General Grant National Parks, California
- Wind Cave National Park, South Dakota
- Yellowstone National Park, Wyoming
- Yosemite National Park, California
- Zion and Bryce Canyon National Parks, Utah

MIMEOGRAPHED STATEMENTS FOR THE FOLLOWING:

- Platt National Park, Oklahoma
- Sullys Hill National Park, North Dakota

GENERAL PARK AND MONUMENT PAMPHLETS:

- Glimpses of Our National Parks
- Glimpses of Our National Monuments

MAPS:

- Small map of the United States showing the location of the national parks and monuments.
- Map of the western half of the United States showing the location of the national parks and monuments and the National Park-to-Park Highway and other principal automobile roads.

NATIONAL PARK PUBLICATIONS SOLD BY THE SUPERINTENDENT OF DOCUMENTS

"The National Parks Portfolio," 270 pages, 1928. $1.
"Forests of Crater Lake National Park," J. F. Pernot, 40 pages, 1916. 20c.
"Origin of the Scenic Features of Glacier National Park," M. R. Campbell, 42 pages, 1921. 15c.
"Wild Animals of Glacier National Park," The Mammals, Vernon Bailey; The Birds, Florence Merriam Bailey, 210 pages. $1.
"Plants of Glacier National Park," Paul C. Standley, 110 pages, 1926. 50c.
"Report on Ancient Ruins in Southwestern Colorado, Examined During the Summers of 1875 and 1876," William H. Holmes. $1.80.
"Features of the Flora of Mount Rainier National Park," J. B. Flett, 48 pages, 1922. 25c.
"Forests of Mount Rainier National Park," G. F. Allen, 32 pages, 1922. 20c.
"Mammals and Birds of Mount Rainier National Park," Walter P. Taylor and William T. Shaw, 249 pages, 1927. 85c.
"Mount Rainier and Its Glaciers," F. E. Matthes, 48 pages, 1928. 15c.
"The Geologic Story of Rocky Mountain National Park," Willis T. Lee, 89 pages, 1930. 50c.
"Mountaineering in the Rocky Mountain National Park," Roger W. Toll, 1921. 50c.
"Geological History of Yellowstone National Park," Arnold Hague, 24 pages, 1928. 10c.
"Geysers of the Yellowstone National Park," Walter H. Weed, 32 pages, 1928. 10c.
"Fossil Forests of Yellowstone National Park," F. H. Knowlton, 32 pages, 1928. 10c.
"Fishes of the Yellowstone National Park," W. C. Kendall, 28 pages, 1915. 5c.
"Canyon Automobile Camp, Yellowstone National Park," Isador W. Mendelsohn, 12 pages, 1925. 5c.
"Sketch of Yosemite National Park and an Account of the Origin of Yosemite and Hetch Hetchy Valleys," F. E. Matthes, 48 pages, 1928. 10c.
"Forests of Yosemite, Sequoia, and General Grant National Parks," C. L. Hill, 40 pages, 1928. 10c.
"The Secret of the Big Trees, Yosemite, Sequoia and General Grant National Parks," Ellsworth Huntington, 24 pages, 1928. 5c.
"The Story of Yosemite Valley," F. E. Matthes, 4 pages, 1922. 5c.

A DESCRIPTIVE LIST OF THE NATIONAL PARKS, INCLUDING THE PARK SUPERINTENDENTS AND NATURALISTS

(Information obtained from the National Park Service Bulletins)

Acadia National Park: Created, 1919. Area, 15 square miles. Located on the Maine coast. A group of granite mountains upon Mount Desert Island and also a bold point on the mainland across Frenchman's Bay,—formerly called

Lafayette National Park. Superintendent, George B. Dorr, Bar Harbor, Maine.

Bryce Canyon National Park: Created, 1928. Area, 22 square miles. Located in southwestern Utah. A box canyon filled with countless arrays of fantastically eroded pinnacles,—best exhibit of vivid coloring of earth's materials. Superintendent, Eivind T. Scoyen, Zion National Park, Utah.

Crater Lake National Park: Created, 1902. Area, 249 square miles. Located in southwestern Oregon. A lake of extraordinary blue in a crater of an extinct volcano, interesting lava formations. Superintendent, A. Elbert C. Solinsky, Crater Lake, Oregon. Park Naturalist, Earl U. Homuth, Crater Lake National Park, Crater Lake, Oregon (winter address, 4735 Vista St., San Diego, California.)

General Grant National Park: Created, 1890. Area, 4 square miles. Located in middle eastern California. Created to preserve the celebrated General Grant Tree, which has a maximum of 40.3 feet in diameter; six miles from Sequoia National Park. Superintendent, John R. White, Sequoia National Park, California.

Glacier National Park: Created, 1910. Area, 1,534 square miles. Located in northwestern Montana. A rugged mountain region of unsurpassed alpine character, 250 glacier-fed lakes of romantic beauty, 60 small glaciers, precipices thousands of feet high, fine trout fishing. Superintendent, J. Ross Eakin, Belton, Montana. Park Naturalist, Dr. George C. Ruhle, Glacier National Park, Belton, Montana.

Grand Canyon National Park: Created, 1919. Area, 1,009 square miles. Located in north-central Arizona. The greatest example of erosion and the most sublime spectacle in the world. Superintendent, M. R. Tillotson, Grand Canyon, Arizona. Park Naturalist, Edwin D. McKee, Grand Canyon, Arizona.

Grand Teton National Park: Created, 1929. Area, 150 square miles. Located in northwestern Wyoming. Includes spectacular Teton Mountains, a granite uplift of unusual grandeur. Superintendent, Samuel T. Woodring, Stewart Ranger Station, Moose, Teton County, Wyoming.

Great Smoky Mountains National Park: Area, 158,799 acres thus far deeded to the Government by the people of North Carolina and Tennessee. Located on the boundary between North Carolina and Tennessee. The last remnant of American wilderness of any considerable size east of the Mississippi, including 18 peaks each about 16,000 feet high, and a million acres of virgin forest.

Hawaii National Park: Created, 1916. Area, 245 square miles. Located in Hawaii. Three volcanic areas, Kilauea and Mauna Loa, active volcanoes on the island of Hawaii; Haleakala, a huge extinct volcano on the island of Maui. Superintendent, Thomas J. Allen, Jr., Hawaii National Park, Hawaii.

Hot Springs National Park: Created, 1832. Area, 1½ square miles. Located in middle Arkansas. Forty-six hot springs said to possess healing properties; many hotels and boarding houses, 19 bathhouses under Government supervision. Superintendent, Joseph Bolten, Hot Springs National Park, Arkansas.

Lassen Volcanic National Park: Created, 1916. Area, 163 square miles. Located in northern California. Only active volcano in the United States proper; Lassen Peak, 10,460 feet; Cinder Cone, 6,907 feet, hot springs, mud geysers. Superintendent, Lynne W. Collins, Mineral, California.

Mesa Verde National Park: Created, 1906. Area, 77 square miles. Located in southwestern Colorado. Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world. Superintendent, Jesse L. Nusbaum, Mancos, Colorado.

Mt. McKinley National Park: Created, 1917. Area, 2,645 square miles. Located in south central Alaska. Highest mountain in North America, rises higher above surrounding country than any other mountain in the world. Superintendent, Harry J. Liek, McKinley, Alaska.

Mt. Rainier National Park: Created, 1899. Area, 325 square miles. Located in west central Washington. Largest accessible single peak glacier system, 28 glaciers, some of large size; 48 square miles of glacier 50 to 500 feet thick; wonderful sub-alpine wild-flower fields. Superintendent, Owen A. Tomlinson, Longmire, Washington. Park Naturalist, C. Frank Brockman, Mt. Rainier National Park, Longmire, Washington.

Platt National Park: Created, 1902. Area, 1⅓ square miles. Located in southern Oklahoma. Sulphur and other springs possessing medicinal value. Superintendent, King Crippen, Sulphur, Oklahoma.

Rocky Mountain National Park: Created, 1915. Area, 378 square miles. Located in north middle Colorado. Heart of the Rockies; snowy range, peaks 11,000 to 14,255 feet altitude; remarkable records of glacial period. Superintendent, Edmund B. Rodgers, Estes Park, Colorado.

Sequoia National Park: Created, 1890. Area, 604 square miles. Located in middle eastern California. The Big Tree National Park; scores of sequoia trees 20 to 30 feet in diameter; thousands over 10 feet in diameter; (the General Sherman Tree is 37.3 feet in diameter and 273.9 feet high); towering mountain ranges including Mount Whitney, the highest peak in continental United States; startling precipices; deep canyons. Superintendent, John R. White, Sequoia National Park, California. Park Naturalist, Frank Been, Sequoia National Park, California.

Wind Cave National Park: Created, 1903. Area, 17 square miles. Located in South Dakota. Cavern having many miles of galleries and numerous chambers containining peculiar formations. Superintendent, Anton J. Snyder, Hot Springs, South Dakota.

Yellowstone National Park: Created, 1872. Area, 3,426 square miles. Located in northwestern Wyoming. Contains more geysers than in all rest of world together; boiling springs; mud volcanoes; petrified forests; Grand Canyon of the Yellowstone, remarkable for gorgeous coloring; large lakes; many large streams and waterfalls; vast wilderness, one of the greatest wild bird and mammal preserves in world; exceptional trout fishing. Superintendent, Roger W. Toll, Yellowstone Park, Wyoming. Park Naturalist, Dorr G. Yeager, Yellowstone National Park, Yellowstone Park, Wyoming.

Yosemite National Park: Created, 1890. Area, 1,126 square miles. Located in middle eastern California. A valley of world-famed beauty, lofty cliffs, romantic vista; many waterfalls of extraordinary height; 3 groves of Big Trees; high sierra; Waterwheel Falls; good trout fishing. Superintendent, Charles G. Thomson, Yosemite National Park, California. Park Naturalist, C. A. Harwell, Yosemite National Park, California.

Zion National Park: Created, 1919. Area, 120 square miles. Located in southwestern Utah. A magnificent gorge (Zion Canyon), depth from 1,500 to 2,500 feet, with precipitous walls; of great beauty and scenic interest. Superintendent, Eivind T. Scoyen, Zion National Park, Utah. Park Naturalist, Angus M. Woodbury, Zion National Park, Springdale, Utah. (Winter address, c/o University of Utah, Salt Lake City, Utah.)

THE NATIONAL CONFERENCE ON STATE PARKS

The National Conference on State Parks was organized in January, 1921, for the purpose of arousing interest throughout the country in State areas for recreation. It concerns itself chiefly with the creation and development of State parks and forests. In the words of Mrs. Beatrice Ward Nelson, its former Executive Secretary, this organization aims: "to conserve the beauty spots of outstanding scenic value and the historic areas of the State Parks; to encourage and aid in the recreational use of these parks by all the people; to encourage and extend the recreational use of State forests; to preserve in its original habitat the native flora and fauna of a State; to protect wild birds and animals through the establishment of State game preserves; to encourage the diffusion of knowledge of the value of State recreational areas through the fostering of Regional Park Conferences; to advocate the preservation for posterity of a heritage of health-promoting and scenic playgrounds; to promote the use of State parks and forests as nature studios, and to formulate and promote a State recreational policy."

To carry out these aims, annual conferences have been held, at Des Moines, Iowa, 1921; Palisades Interstate Park, New York, 1922 and 1927; Turkey Run State Park, Indiana, 1923; Gettysburg, Pennsylvania, 1924; Skyland, Virginia, 1925; Hot Springs, Arkansas, 1926; San Francisco, California, 1928; Clifty Falls State Park, Indiana, 1929; and the tenth annual meeting in 1930 at Linville, North Carolina. A survey has been made of the State parks and forests throughout the United States and a report published. A detailed study of all phases of state park method—selection, acquisition, development, administration and use—is being sponsored and will be published in book form. An attempt has been made to coordinate park and forest progress in the Ohio Valley and the southwestern regions in two regional state park conferences. The number of states possessing State preserves has increased from twenty to forty-three since the organization of the Conference, and at present a total of 600 or more State parks and 170 State forests exists.

The organization publishes a quarterly entitled " State Recreation " sold only as a part of membership fee. It has also issued " State Recreation; Parks, Forests and Game Preserves " by Beatrice Ward Nelson, a 436-page report of conservation activities throughout the country, and in August, 1930, published a volume entitled " A State Park Anthology " which includes some very excellent material on state parks.

According to information obtained from Mr. Herbert Evison there are only two State Park systems in which nature education is carried on systematically—Palisades Interstate Park, New York, and the State Parks of Indiana. The nature museum and nature trail service at the Palisades is sponsored by the American Museum of Natural History. Nature guiding is carried on in Turkey Run State Park and Clifty Falls State Park in Indiana, and in these two places they have quite a well developed program of activity. William Carr is in charge of the nature study work at the Palisades Interstate Park, and has recently prepared a report published by the American Museum of Natural History under the title of " Trailside Conversations."

The headquarters of the Conference are in the Union Trust Building, Washington, D. C. Its officers are: Major William A. Welch, vice-chairman and acting chairman; Colonel Richard Lieber, vice-chairman; Herbert Evison, executive and field secretary.

LEADERSHIP TRAINING IN NATURE AND SCIENCE EDUCATION

E. Laurence Palmer

The success of most educational projects depends to no small degree upon the leadership identified with them. This is just as true of nature and science education as of any other educational activity. Possibly it is more true, since it requires a more versatile individual with a more comprehensive training to take students into the field where most departments of science may present problems, than to teach a special subject within the confines of a classroom where all extraneous distractions may be and generally are unheeded.

The leader in nature education may be called upon to answer the same questions which might be asked a physicist and with the next moment be asked something that would challenge the training of a botanist, a zoologist, an entomologist, a chemist, a geologist, a physician, a bacteriologist or a paleontologist. At the same time, he may be more severely criticised by a professional educator for the way that the questions are answered than would that same educator criticize the specialist in the limited science fields. While a botanist may pass as a botanist with credit if he knows well the systematic botany of a given region, the " naturist " or nature education leader may expect to be asked about economic botany, plant pathology, plant physiology and about the best artistic reproductions of botanical subjects concerning all of which the systematic botanist would be expected to know little.

Leadership training has varied from a more or less perfunctory " course " taught by anyone willing to do so in connection with the general training programs for the juvenile and camp groups, through the training offered in teachers colleges and normal schools by reasonably well prepared individuals, to the special training schools run in connection with the universities for the purpose of training special nature leaders for one or another function.

The general problems of leadership training for the so-called " volunteer " organizations have been dealt with in the accounts of these organizations earlier in this book. An exhaustive study of the teachers colleges and normal schools has been made and the local situations are cared for under the treatment of each of the specific states later in the book. The situation in the special training schools is summarized at the end of this section.

NATURE LEADERSHIP IN NORMAL SCHOOLS AND TEACHERS COLLEGES

A number of studies have been made of the situation concerned with nature or science education in normal schools and teachers colleges. Since the last issue of the Almanac appeared, there have been important papers published on the subject by Dr. Van DeVoort, Professor Ullrich, and Dr. Florence Billig. Two of these were doctor's theses and the third was the result of an intensive questionnaire study made by a group of normal school presidents who were interested in planning the curricula of their schools to meet the growing demand for four-year training for elementary school children. Dr. Van DeVoort's study was made primarily of the catalogue offerings of the teacher training institutions. Dr. Billig was concerned more with the content being taught. Professor Ullrich was interested in the number of hours, the nature of the content and the placement of the various phases of science education in the general program of the institutions. Mr. Ralph Edeburn has completed a study dealing with the science background of rural teachers in service with the view of understanding something of what might be expected of such teachers in using a program of statewide significance. An abstract of his findings is given later.

The study here published is based upon the combined findings of a number of graduate students working under the direction of the writer. Only the portions of the findings of these students pertinent to the nature of the *Almanac* are published, of course.

The individuals most closely involved with this study are Professor George Friedrich of St. Cloud, Minnesota State Teachers College, Miss Jessie McNall of the Potsdam, New York State Normal School, Mr. Ralph Edeburn of the Aliquippa, Pennsylvania High School, and Milton Calloway of the faculty of Morgan College, Baltimore, Maryland.

Detailed questionnaires were sent to all teacher training institutions listed in the *Educational Directory* published by the Bureau of Education of the United States Department of the Interior. While only thirty-four smaller questionnaires were returned when a similar study was made three years ago for the first edition of the *Almanac,* one hundred and eight of the more complex questionnaire, were returned this year. It would seem that this evidences increased interest on the part of the teacher-training institutions in the work being done by the *Almanac*.

After working up the data supplied by the questionnaires, members making the study made personal visits to a large number of the institutions to determine from first hand experience the degree to which one might rely upon the questionnaire returns. These visits were made possible by The Charles Lathrop Pack Forestry Trust which is supporting the Charles Lathrop Pack Fellowships in Nature Education and Forestry at Cornell University. The visits made included institutions from Massachusetts to Minnesota and south to Washington, D. C. They supplemented visits made the previous year by Professor Karl Hazeltine of the San Jose, California State Teachers College, who covered the territory from New York to Colorado.

The generalizations here given, then, are based primarily upon data secured from exhaustive questionnaires checked to a considerable degree by personnel visitation by a limited number of individuals who were capable of drawing reasonable conclusions. Material which duplicated or agreed with the findings of Van DerVoort, Ullrich and Billig is not given emphasis here.

The only states of the Union not involved in the returns here considered are Alabama, Arizona, Colorado, Delaware, Mississippi, Montana, Nevada, New Mexico, New Hampshire, Utah, Vermont and Wyoming.

TEACHING LOAD OF NATURE TEACHERS IN TEACHERS COLLEGES AND NORMAL SCHOOLS

According to figures supplied by Mr. Friedrich, ninety-two teacher-training schools supplied adequate information on the teaching load of the science teachers. In these schools, the average number of classroom hours is 17.56 per week. To this, should be added an average of 1.59 hours spent each week in the supervision of student teachers, making a total of 19.45 hours per week. In 58.7 per cent of the institutions reporting, supervision of this sort is not an obligation and here the average teaching schedule is 18.92 hours per week.

In the remaining 41.2 per cent of the schools where supervision is required, the average teaching load is 20.03 hours per week plus an average of four hours spent in supervision.

Extra curricular activities are generally required of staff members in all of these institutions and these require on the average 3.13 hours per week. In addition, these teachers spend on an average of 7.61 hours per week in student conferences, looking over papers, stocking the laboratory and in similar necessary activities. Adding the general average of teaching to the general averages of student conferences and extra curricular activities we find these teachers carrying a load of 30.19 hours per week. These figures do not include the time the teachers spend in preparation and review for new work in the classroom.

According to the requirements of the National Association of Teachers Colleges, the actual number of teaching hours must not exceed sixteen hours per week for an A1 rating for these institutions. This standard of sixteen or less hours of teaching and required supervision is reached in 31.5 per cent of the schools reporting. A schedule of from seventeen to twenty hours is carried by 34.8 per cent of the teachers of the schools and the remaining 33.7 per cent carry a load of over 21 hours per week. The number of actual teaching hours for all of the schools vary from twelve to thirty hours per week.

If we include all the teaching obligations of these teachers we find that 22.8 per cent have totals of twenty-three hours or less, 27.2 per cent have from twenty-four to twenty-eight hours and twenty-five per cent from twenty-nine to thirty-three hours. The remaining twenty-five per cent have thirty-four or more hours. The total teaching load varies from sixteen to fifty-two hours per week.

An inspection of the teaching load of nature teachers in these institutions may provide adequate clues as to why these teachers do not make more extensive contributions to research and publication.

Assistance. Over half, (52.2 per cent) of the ninety-two schools reporting have no paid assistants for their nature or science teachers to help in correcting papers and in collecting for class use. One paid assistant is employed in each of 33.4 per cent of these schools and two to four in the remaining 17.4 per cent.

Sizes and Classes. The number of students in the classes of ninety-one schools varies from nine to seventy-five. One-third of the schools limit their number of students to thirty members per class. The median and average is thirty students. This is not an excessive number for classroom work but is larger than should be the case for the most effective work on field trips.

Number of Courses Taught by Each Teacher. The number of courses taught by one teacher per term ranges from one to five. The average is 2.67 courses. This number is not greatly in excess of the number ordinarily taught by university professors and is considerably less than is the case with many high school instructors.

Length of Periods. In fifty-two per cent of the schools, the schedule is not arranged to permit double laboratory periods for nature study or elementary science.

Of the remaining forty-eight per cent, forty-four have either one or two double laboratory periods per week. Thus, in a majority of the schools, any laboratory or field project must be dropped at the end of the fifty minutes (the conventional length of a class period). The average number of double laboratory periods per school of the ninety-nine schools answering the question is eighty-eight hundredths of one double period.

Methods or Professional Courses. A question of the value of methods or professional courses, as such, was asked of the teachers. Out of ninety-five schools, 27.4 per cent reported the methods courses of " great " value, 46.3 per cent of " fair " value, and 26.3 per cent of " little " value. Notations accompanying this section of the questionnaire indicated that many thought that methods courses in conjunction with factual teaching material were of great value. These statements indicate that, had the question been more fully explained, the percentages of the answers would have been different. As the question stands, the term " methods courses " means courses separate from factual teaching material.

Summer Session Opportunities. Out of ninety-nine schools reporting, 22.2 per cent either have no summer session or failed to answer the question. Larger classes in the summer school sessions than during the regular school year are reported in 34.4 per cent. Smaller classes are reported in 21.2 per cent, and 22.2 per cent report the classes equal to those of the regular school year. In general, it seems that there is nearly as much activity in the nature study field in the summer as during the school year.

OUTDOOR TEACHING

A survey of the out-of-door teaching situation was made. In order to determine what would consist of a reasonable amount of outdoor teaching, it is necessary to determine the time available in the daily schedule for the taking of field trips. This available time is possible during, (1) the class period, (2) any free hours at the close of the daily session, and (3) week-ends. The time during the class period is available at the discretion of the teacher. There is an average of 1.4 hours of free time between the close of the daily session and 5:30 p. m. Many teachers avail themselves of this time. However, a large number indicate that other college activities seriously interfere with and prevent the taking of trips after the regular session. Of one hundred schools reporting, eighty-three per cent have no school session on Saturday and seventeen per cent have. From these figures, it seems that Saturday trips for the large majority of schools is entirely possible. But, students in a great many institutions leave the campus on week-ends and are not available. It is found that in fifty-two per cent of the schools, one-third of the students or less absented themselves on week-ends. Thus, it is reasonable to assume that Saturday field trips can be profitably made in more than one-half of the schools. In the remaining forty-eight per cent of the schools, where more than one-third of the students are not available, field trips would appear to be impractciable.

Transportation in Field Work. Since, in general, field trips after school and on week-ends are desirable and feasible, the manner of transporting the students should be given consideration. It was found that twenty per cent of the ninety-nine schools reporting are able to transport their students by means of their own college buses. Student automobiles are relied upon for transportation in 55.5 per cent of all the schools reporting. In sixty-nine per cent, students go by means of street cars, rented vehicles, and other ways not noted. In seventeen per cent there are no means of transportation available.

Since many schools utilize several ways in transporting their students, the percentages are based in each case upon the total number of schools. One should seriously question the wisdom of so large a number of schools allowing students to be transported in a school activity by student automobiles. These students are required by the teacher in most cases to make the trip. Any accident of a transportational nature should be the responsibility of the school. However, as the various state laws are framed, the responsibility may fall upon the student driver. This driver, in turn, has been forced into this responsibility as he is a member of the student group. Any activity of the college, worthy of being carried on, should be the concern of the college authorities. Those schools which transport their students by a bus owned by the college, and driven by a college employee responsible to the authorities, are following the right trend in the transporting of their students. It is assumed that street car and railroad companies are responsible for their passengers (students) when traveling over their lines.

Numbers of Field Trips. It was found that out of ninety-nine schools reporting, 84.8 per cent conduct field trips and 15.2 per cent conduct none. Of the ninety-nine schools, 79.8 per cent conduct field trips during the class period; 27.2 per cent conduct trips during the day other than the class period (probably after the close of the school session); 27.2 per cent conduct trips during the week-end (probably on Saturdays); and 13.1 per cent conduct extended tours (one full day or more).

The average number of field trips made for the ninety-nine schools is 12.1 per semester. Only sixteen schools report making no field trips. These excursions vary from none in some schools to more than thirty in others. Trips made during the class period average 9.58, and 2.52 are made after the daily college session is over or on week-ends. The number of these latter trips vary from one to fifteen per semester. The distribution of trips during class period shows three schools with eleven to twelve per semester; twenty with thirteen to sixteen per semester; thirty-four with seventeen to twenty per semester and thirteen with twenty-one to twenty-four per semester.

Note: In order to make the number of field trips taken by the schools under the quarter system comparable to those under the semester system, the number of field trips made by schools operating on a quarter basis was multiplied by a constant. It is of passing interest to note that 42.4 per cent of the schools operate on the quarter basis, and 57.6 per cent on the semester basis.

Field Trips and Size of Classes. One is curious to know if the size of the class acts as a deterrent in the making of field trips. The schools were divided into three groups from point of view of the number enrolled in the classes. Out of eighty-nine colleges, 38.2 per cent of the schools having an enrollment of twenty-five or less students per class, made 11.9 trips per semester; 41.6 per cent of the schools having twenty-six to thirty-nine students per class, made 12.9 trips per semester; 20.2 per cent of the schools, having forty or more students per class, made 12.3 trips per semester. From this data it is apparent that the size of the class does not deter the teacher from attempting outdoor teaching by means of field trips.

Teaching Load and Number of Field Trips. It is also interesting to determine what effect the number of actual teaching hours per week has upon the extent to which field trips are made. Out of ninety-two colleges, 31.5 per cent having sixteen hours or less of actual teaching per week, made fourteen trips per semester; 34.8 per cent of the schools, having from seventeen to twenty hours of actual teaching per week, made 12.8 trips per semester; 33.7 per cent of the schools, having twenty-one or more hours of actual teaching per week, made 10.7 trips per semester. It may be noted here that the number of field trips made per semester decreases slightly as the number of actual teaching hours increases.

However, when the total teaching load, i. e., the number of actual teaching hours plus hours given to extra-curricular activities and hours given to students' conferences, stocking laboratory and the like, is placed alongside the number of field trips made per semester, a different situation is noted. Thus, out of ninety-two schools, 22.8 per cent having a total teaching load of twenty-three or less hours, made 13.8 trips per semester; 27.2 per cent of the schools, having a teaching load of twenty-four to twenty-eight hours, made 11.4 trips per semester; 25 per cent of the schools having a teaching load of twenty-nine to thirty-three hours, made 12.4 trips per semester; and twenty-five per cent of the schools having a teaching load of thirty-four hours or more made 14.3 trips per semester. Apparently a heavy, total teaching load does not deter the teacher from making field trips. In fact, the teachers having the heaviest load made, on the average, the greatest number of field trips.

It is interesting to check the practice in regard to field trips in teacher training institutions with the judgment of the value of trips expressed by school superintendents. In "Nature Education in Elementary Schools" published by the American Nature Association in 1926 it was reported that one hundred eleven of one hundred forty-eight mid-west school superintendents favored field trips in nature study. A majority of these felt that at least 50 per cent of the work in nature study should be taught by field trips. If we may accept these views as representative and educationally sound, it is entirely fitting that a generous portion of the time spent in teacher preparation for this work should be in the field. One of the superintendents aptly suggested, " Absent treatment is not worth much in science." Interestingly enough the judgment of a few of the superintendents was to the effect that as few as three trips a year was adequate field work for nature study in elementary schools.

Areas Commonly Visited on Field Trips. Teachers were asked to indicate the type of natural areas visited on field trips. These areas were listed as of " ¼ mile radius " with the classroom as the center, " ½ to ¾ mile radius," " ¾ to 5 mile radius," and "5 to 60 mile radius." There were twenty different types of areas listed. The number of schools visiting each different type within the different radii is given below. In each case, the school is credited with having visited the particular type of area within one radius only, and always within the shortest radius. In this way, repetitions which would complicate the final conclusions have been avoided. In reading this list (based on ninety-nine schools), one should proceed as follows: twenty-eight schools visit the general woodland within the one-fourth mile radius; sixteen schools within the one-half to one-fourth mile radius, and so on, there being sixty schools in all that make a practice of visiting general woodlands in the field trip activities.

Type	¼ mile radius	½ to ¾ mile radius	¾ to 5 mile radius	5 to 60 mile radius	Total
General woodlands	28	16	12	4	60
Cultivated gardens	44	9	5	0	58
Streams (under fifty feet wide)	22	7	20	2	51
Open prairies	27	13	8	2	50
Ponds	20	9	11	4	44
Parks	13	14	10	6	43
Forests	12	9	10	8	39
Swamps	11	10	11	4	36
Wastelands	17	5	8	1	31
Nurseries	11	5	12	2	30
Steep stream banks	6	6	9	5	26
Streams (over fifty feet wide)	4	5	11	2	22
Zoos	1	3	7	7	18
Museums (over 1000 specimens)	4	2	9	3	18
Lakes	1	4	6	6	17
Fish hatcheries	1	4	5	7	17
Gorges and canyons	2	3	3	4	12
Wild animal farms	1	3	2	4	10
Oceans	1	1	2	3	7
Deserts	1	0	0	5	6

In the above statement, the totals on the right show the frequency, in order, with which the locations are visited by the different schools. It will be noticed that, in general, areas common to the cities and immediate vicinity are visited most frequently. Those areas not normally found within a city's limits are less frequently visited. Examples of these are "cultivated gardens" in cities and "wild animal farms" away from cities. Extended tours are practically negligible in teacher-training institutions.

Groups Studied on Field Trips. It is interesting to note the forms studied on field trips and the frequency with which they are studied. Out of ninety-nine schools, seventy-eight study "wild flowers" in the field. This group takes first rank as a study by the schools. The complete list is given here, the number of schools reporting being given after each group studied:

Wild flowers, herbs, seventy-eight; birds, seventy-three; woody plants, seventy-two; weeds, seventy-one; insects, sixty-three; garden plants, sixty-one; fungi, forty-eight; mammals, forty-four; astronomical bodies, forty-three; weather, forty-one; earth formations, forty; liverworts, mosses, ferns and their allies, forty; amphibia, thirty-nine; algae, thirty-seven; reptilia, thirty-two; field crops, thirty-two; invertebrates other than insects, twenty-six; rocks and minerals, twenty-six; fish, twenty-three; fossils, seventeen; protozoa, six; bacteria, six.

In general, those forms best known to the average person are most frequently studied in the field. To a large extent, those forms are studied which are easiest to observe near the school.

General conclusions. In general, it may be stated that the average load of the nature study or elementary science instructor in teachers colleges is very heavy and that the amount of outdoor teaching done by them is a considerable one.

NATURE OF COURSES OFFERED

An uncompleted study of one hundred teachers' colleges and normal schools by Milton L. Calloway shows that eighty-one per cent offer *content* courses in nature study or elementary science for elementary school teachers in training. Forty-five offer this in the first year, nineteen in the second, two in the third and the twelve others reporting allow some election of the years. The commonest method followed is that of a combination of lecture, laboratory and field work which procedure is the practice in fourteen of eighty-one schools reporting. The next commonest method involves laboratory work in addition to those methods previously listed. This combination is the practice in ten schools. Eight follow a practice of recitation and field work only and seven teach by the lecture, laboratory and field work methods. Six use lectures only.

In eighty-one schools reporting, 60.4 per cent offer nature study or elementary science on a required basis and 9.8 per cent offer it on an elective basis. The remainder merely reported that they offered the work without specifying on which basis.

Out of forty-six institutions reporting that they offered *special methods* courses in the teaching of nature study or elementary science, forty-one per cent made the offering in the first year, thirty-two per cent in the second and nine per cent in the third. The remainder allow election. The methods followed in teaching these classes vary considerably, the commonest practice involving a combination of recitation, laboratory and field work. This is the practice in fifteen per cent of the schools. Strangely enough the next most common practice is by means of lecture only which is the custom in nine per cent of the schools. In 56.5 per cent of the forty-six schools reporting, the methods course appears on a required basis and in 6.5 per cent, on an elective basis. The remaining group did not specify the conditions existing.

Forty-seven of the schools require work in nature or science methods of kindergarten teachers in training and seventeen do not. The remaining thirty-six did not specify on this point. For rural teachers in preparation, there were forty-four institutions with requirements in this field and thirty-one with none. For general elementary teachers, there were fifty-eight requiring and eleven not requiring preparation in methods of science.

OBSERVATION AND PRACTICE TEACHING IN NATURE STUDY

Teachers in training were given practice in teaching elementary science or nature study in one hundred and three of one hundred and eighteen schools. This was most common in the training school of the institution itself, this being the practice in one-third of the schools. The other schools supplied this experience through associated public schools or through combinations involving both these institutions and the normal schools or teachers colleges themselves. Opportunity for observation of science or nature teaching was generally provided in the institutions surveyed. In thirty-eight per cent of the schools the teachers of the training schools were observed doing model teaching. In about twenty per cent of the schools the students observed teaching by both members of the training school and normal school or teachers college staff.

The science or nature work taught in these institutions is most generally planned by the science teachers of the normal school or teachers college and supervised by the teachers of the training school. There are forty schools in which each of these practices is observed. In the other institutions, a variety of authorities determine the practices. Details of individual lesson plans are generally the responsibility of the teachers of the training school, this being the practice in thirty-five schools. In fifteen, this is a joint responsibility of the teachers of the training school and of the normal school or teachers college; and in twelve cases, the responsibility of the teachers of the normal school or teachers college faculty. Conferences relative to practice work are generally held with the practice school teachers, this being the case in twenty-two schools while in eighteen cases this is a joint responsibility as suggested above.

Practice in teaching nature study is generally confined to the lower grade levels. In seventy-two, this is the practice in the elementary school and in thirty-five of the grammar school. Interestingly enough, there are seven schools in which this work is offered for practice at the junior high levels and in three at the senior high levels.

Mr. Calloway's study when complete will concern itself with a study of similar practices in all the sciences for most of which he now has abundant data.

SCIENCE PREPARATION OF TEACHERS IN SERVICE AND IN TRAINING

A recently completed study by Ralph Edeburn dealing with the science preparation of teachers in service and teachers in training was based in part upon returns from the same institutions involved in this survey. The purpose of the study was to determine in part whether or not teachers in training were getting more preparation in science than were teachers already in service. His study was based upon returns from 1,700 rural New York teachers in service and seventy-eight science teachers in different teacher training institutions. Each group was asked to indicate whether or not the training in science exceeded, was equal to or was less than that in the other elementary school subjects. In each case, there should probably be some discounting of the returns. Teachers in service interested enough to make the returns were probably more adequately trained in the field or at least more interested in it than those not making returns and probably represented a condition better than the average. On the other hand, training school staff members can judge with difficulty the actual profit their students may have secured from attendance in their classes and as a result their judgment should be subject to some adjustment. What a student is offered or exposed to in class is generally a poor criterion as to the amount of useful material he or she may have gotten from the experience.

With these limitations in mind, one may find some value from the following findings of Mr. Edeburn:

Teachers in Training.—Apparently the amount of training given in music and science in teacher training institutions is about equal. In 34.6 per cent of the schools it was reported that there was more training in science than in music. In 33.3 per cent it was reported that the two were equal and in the remaining 32.1 per cent the training in music exceeded that in science.

Drawing offered a more serious competition with science in these schools. In only 25.6 per cent, was it stated that the science offerings or requirements exceed those of drawing. In 33.9 per cent, the two were equal and in 39.5 per cent there was more drawing than science.

Geography about equalled science in these schools. In 25 per cent, there was more science than geography and in 32.4 per cent this was reversed. In the remaining 42.6 per cent, the training was stated as being equal.

Science ran slightly behind arithmetic exceeding that subject in only 24.6 per cent of the schools and dividing the remaining schools equally on a 37.7 per cent basis between those in which it equalled and those in which it was less than arithmetic. These figures were considerably more favorable towards science than those prepared from the returns from teachers in service.

In 49.2 per cent of the teacher training schools more preparation is given to help teachers teach science than to teach spelling. In 19.4 per cent the two are equal and in 31.4 per cent the spelling training is reported as exceeding the science training.

Science loses out remarkably when compared with training in reading, language and physical training. In only 20.6 per cent of the schools, does the training in science exceed that in reading. In 48.5 per cent, reading exceeds the science and in the remaining 30.9 per cent the two are equal.

In 25 per cent of the schools, there is more preparation to teach science than to teach language but in 42.6 per cent this order is reversed. In the remaining 32.4 per cent the two are reported as being equal.

There is more preparation to teach physical training than to teach science in 61.2 per cent of the training institutions apparently. In only 20 per cent is this order reversed. In the remaining 17.8 per cent the two are equal.

Teachers in Service.—The teachers in service reported that their background for teaching science or nature study was less than that to teach the following: language, reading, arithmetic, spelling and geography. It was about equal to that helpful in teaching music, drawing and physical education.

It is hardly possible here to publish the detailed returns from teachers in service available through Mr. Edeburn's study. It does point out, however, the necessity of keeping the problems of these people in mind in planning any program for wide adoption.

Some clue as to the situation may be given when it is stated that New York's rural teachers in roughly four cases out of seven have access to less than ten books (not pamphlets) which may help them in science teaching. The only three magazines available to a quarter of these teachers are Nature Magazine, National Geographic Magazine and Normal Instructor and Primary Plans. The last named is available to nine out of ten of the teachers of rural New York.

THE CONTENT OF NATURE STUDY OR ELEMENTARY SCIENCE

Miss Jessie J. McNall has made a study of the content of the courses offered in normal schools and teachers colleges as nature study or elementary science to determine the subjects covered, the manner in which they are treated and the equipment used in the class work. It was difficult to place the emphasis arbitrarily in certain cases and in all probability the interpretations of the figures given should be generous. Nevertheless, some value should arise from her study of these phases of nature education in the teacher training institutions.

The figures following each of the subject matter departments will give some clue as to the recognition given the departments by the teachers and in addition will show which practices are the more common in handling these phases of the work. For convenience here, the topics dealing with biology, with the earth sciences and with the physical sciences are separated.

Biological Topics

Wild flowering herbs are studied in the field in sixty-one schools, alive in class in thirty-seven, as preserved specimens in eighteen and without actual specimens in six.

Birds are studied in the field in fifty-eight schools, as skins in twenty-nine, in captivity in twenty-two and without actual specimens in eleven.

Mammals are studied in the field in thirty-four schools, in captivity in thirty-one, as skins in twenty-five and without actual specimens in twenty.

Fungi are studied alive indoors in forty-two schools, in the field in thirty-seven, as preserved material in twenty-one and without actual materials in six.

Amphibia are studied alive indoors in fifty schools, in the field in twenty-nine, as preserved specimens in twenty and without materials in seven.

Insects are studied in the field in forty-nine schools, alive indoors in forty-eight, as preserved specimens in thirty-two and without actual materials in five.

Woody plants are studied alive in the field in forty-five schools, alive indoors in thirty-five, as herbarium specimens in sixteen and without actual specimens in eight.

Weeds are studied in the field in fifty-seven schools, alive indoors in thirty-one, as herbarium specimens in eight and without materials in five.

Garden plants are studied in the open in forty-seven schools, alive indoors in thirty-four, as herbarium specimens in eight and without material evidence in four.

Algae are studied alive indoors in forty-one schools, in the field in twenty-eight, as preserved material in seventeen and without material reference in four.

Reptiles are studied in captivity in thirty-seven schools, in the field in twenty-four, as preserved specimens in sixteen and without material reference in eleven.

Fish are studied in captivity indoors in forty schools, outdoors in twenty-one, preserved in sixteen and without material reference in eleven.

Mosses, liverworts and their allies are studied alive indoors in thirty-six schools, in the field in thirty, as preserved material in thirteen, and without material reference in two.

Invertebrates other than insects are studied in captivity indoors in twenty-five schools, in the field in twenty, as preserved material in twenty and without materials in six.

Bacteria are studied alive indoors in thirty schools, as preserved materials in fifteen, without material reference in thirteen and in the field in two.

Protozoa are studied alive indoors in thirty-nine schools, without material reference in ten, from preserved material in seven and in the field in four.

Field crops are studied in the field in twenty-eight schools, alive indoors in fourteen, without material reference in twelve and from preserved material in four.

Earth Science Topics

Rocks and minerals are studied from material indoors in forty-three schools, in the field in twenty-two and without material reference in seven.

The weather is studied outdoors in thirty-eight schools, without material reference in eighteen and indoors with some material evidence in fourteen.

Astronomy is studied outdoors in thirty-four schools, without reference to the stars as actual things in twenty-five and indoors with material helps in seven.

Earth formations are studied in the field in thirty-seven schools, without material reference in fourteen and indoors with material reference in twelve.

Fossils are studied indoors with material evidence in thirty-three schools, in the field in fourteen and without material reference in five.

It is interesting to notice that with the exception of the topic, fungi, the first nine topics were also in the first nine mentioned in the list published in the first edition of the *Almanac* and based upon returns from thirty-four schools instead of from over a hundred. The topic on birds takes second place in our new list instead of the first which it held formerly. Wild flowers, as a topic takes the lead. The topics, mammals, and amphibia, advance in rank while the others move down in the list. In each list, the topic, reptiles, holds eleventh place while the remaining biological topics common to both lists appear in the same sequence they held formerly. The newcomer, fungi, appears in fourth place where before it had no place whatever.

The survey of this year shows a general tendency of training school teachers to study materials out of doors in the field or alive indoors where possible. Comparatively little seems to be done without reference to actual things. This, it would seem, approaches the ideal. It is hoped that the reports present the actual picture.

Physical Science Topics

Physical science topics were reported as being presented in a little less than one-half the schools reporting. Where they were offered, they were presented with materials for demonstration purposes in about two-thirds of the cases. The frequency with which topics appeared and the manner in which they were presented is shown as follows:

Chemical change was presented in thirty-four schools by physical demonstration and in ten without it.

The states of matter was presented as a topic in thirty-four schools with material demonstration and in eight without it.

Heat, light and electricity were each presented in forty-one schools. Physical demonstrations were used in thirty-six cases with electricity, in thirty-three cases with heat and in thirty-one cases with light.

Sound was presented as a topic in thirty-eight schools, twenty-seven doing so by means of physical demonstration.

Gravity was presented as a topic in thirty-eight schools, twenty-eight of which used physical demonstrations in doing so.

The general properties of matter was considered an appropriate topic in thirty-seven schools, in twenty-seven of which physical demonstrations were used.

Machines were demonstrated in twenty-four schools and discussed without demonstration in nine.

ORGANIZATION OF MATERIALS

It was felt desirable to determine whether or not the materials presented were organized so as to develop any particular viewpoints, or background. Accordingly, a goodly number of probable topics were presented to the schools in the hope that we might determine whether the work developed along the lines of health education, recreation, conservation or what not. The reader may draw his own conclusions from the following which shows the number of schools reporting as presenting the various viewpoints:

Conservation, sixty-three; seasonal studies, sixty-two; continuity of matter, fifty-five; ecological relationships, fifty-four; health and disease, fifty-one; ancestry and heredity, forty-six; beauty forty-six; physiological relationships, forty-three; food values, forty-two; recreation, forty; distribution, thirty-five; taxonomy, thirty-two; shelter, twenty-five; transportation, twenty-four; communication, twenty-one; commercial relationships, nineteen; power relationship, sixteen; legal aspects, seven.

The work is evidently organized with some vocational activities more in mind than with others. For example, fifty-nine schools report their work as organized to contribute to agriculture, fifty-five to contribute to forestry, thirty-one to contribute to industry, twenty-two to contribute to commerce, sixteen to contribute to mining and ten to contribute to the marine industry.

The inductive method seems to be used more than the deductive though most teachers use both varying from one to the other as occasion demands. Fifty-nine schools are represented by nature or science teachers who think the inductive more valuable, and forty-four use the deductive more commonly.

PHYSICAL EQUIPMENT

It was felt that a survey of the physical equipment available for use in teacher training institutions might give some light on the probable activities going on there in nature education. Accordingly, a rather comprehensive list was submitted which brought out that certain units of equipment were nearly always present while others were nearly always absent. This study was made, in part, with the view of determining which schools were equipped to carry on certain research problems in which Miss McNall was interested.

Aquaria were a part of the equipment of seventy schools. Lantern slides were used in sixty-five schools, potted plants in sixty-two, terraria in fifty-six, equipment for preserving organisms in fifty-two, materials for making terraria and aquaria in forty-four, physics apparatus in forty-two, chemistry apparatus in forty-two, drawing equipment in forty, motion picture equipment in thirty-five, sand tables in thirty-one, ink-printing equipment in twenty-nine, photographic equipment in twenty-eight, models and model-making equipment in twenty-seven, reflectoscopes in twenty-three, chart-making equipment in twenty, stereographs in seventeen, track-casting equipment in eleven and sound picture equipment in none.

USE OF EQUIPMENT

It is not convenient to print here the data dealing with use of equipment. The records indicate, however, that fresh living material is the most commonly used materials. Charts, pictures, preserved material and lantern slides seem to be used about equally. Comparatively little teaching seems to be done without visual aids. This may account for the fact that one nature teacher who claimed that he " was naturally gifted with the ability to speak " and who testified that he relied essentially upon this ability to succeed is no longer on the teachers college staff of which he was once a prominent member.

Ten schools report that all of their graduates were trained in the use of a stereopticon. It appears that few teachers are as yet trained in the use of the machines which promise to do so much to revolutionize educational method. Very few apparently are taught anything about the operation and care of the smaller motion picture equipment which is becoming so popular and so splendidly supported by useful educational films.

THE TRAINING OF SPECIALISTS IN NATURE EDUCATION

While the normal schools and teachers colleges of the country have been concerned largely with giving some nature or science training to teachers whose duties will be of a general type there have appeared throughout the country schools more definitely concerned with the training of the specialist.

What Woods Hole Biological Station, the Puget Sound Biological State and the Scripps Institute Station at La Jolla, California, have been to scientists interested in research in science these other centers have aimed to be in the field of the teaching of science. Interestingly enough three of them sprang into being practically simultaneously in widely separated parts of the country. The Nature Lore School founded in New England by Dr. W. G. Vinal, The McGregor School of Wild Life Protection in the Middle West and The Yosemite School of Field Natural History all came into being at about the same time. It is quite true that much of the work carried on by these schools duplicated that which had been and is carried on in departments of the larger institutions. For the most part all of these schools have been held in the summer months and after the initial years the work has assumed sufficient calibre to warrant the giving of college credit for it.

Cornell University has for years offered courses in nature study and allied work during its summer sessions and during the regular year. Opportunity for carrying this work on at graduate school levels is provided here. Other universities offering work in nature study as such have included Columbia University, the University of Chicago, Utah Agricultural College, Pennsylvania State College and the University of Pittsburgh. At Pennsylvania State College the courses are held on the campus and in a special camp where two intense three-week sessions are held. These are under the direction of Professor G. R. Green. At Cornell University, the work in summer is held for the most part on the campus which is ideally situated for the work. This is accompanied by forty-eight hour week-end sessions where intense studies of different ecological units are made. This program has been duplicated to a degree in the past at the Utah Agricultural College and elsewhere.

Those interested in further inquiry into the matter of teaching about nature in the camp situation would do well to read the following:

" The Camp in Higher Education," Marie M. Ready, Pamphlet, No. 1, Office of Education, United States Department of the Interior, February, 1930.

" Biological Field Work Including a Directory of Summer Camps and Biological Stations," General Biological Supply House, 761-763 East 69th Place, Chicago, Illinois, 1930.

So varied are the offerings of the institutions that it would seem that anyone should be able to find a school to suit his needs. It is probable that as time goes on the schools will tend to specialize rather than generalize. This will be due to the fact that one or another finds success in training for particular fields with the result that emphasis is placed on these fields and those interested in them are drawn to these institutions. It would seem that, as organized at present, there are schools to meet these particular needs: the nature needs of teachers whose obligations are general; the needs of those who are to be specialists in nature education; the needs of those whose interests are superficial though genuine, who will not be specialists but will be intelligent lay readers; the needs of those interested in using their college career to perfect themselves for nature leadership; the needs of those who wish to accompany their desire for travel with organized study under capable leadership; the needs of those with considerable experience who wish by further study of graduate grade to lead in the discovery of principles valuable in developing leadership in others. Already there are institutions that have become more or less specialized in these different fields.

YOSEMITE SCHOOL OF FIELD NATURAL HISTORY

Harold C. Bryant, Formerly Director

The Yosemite School of Field Natural History was founded in 1925 in answer to a demand from school superintendents who wished better trained teachers and the need of more and better trained individuals for nature guide service. It seemed a natural outgrowth from the well established Yosemite Nature Guide Service which provided a nature education program in Yosemite National Park each summer. The Yosemite nature guides made up the staff of the school with the addition of a few outside members.

The aim of the school is to train students to study and interpret living nature so that they may lead others to similar profit and enjoyment, and thus make an educational contribution to the conservation of natural resources. The school is affiliated with the National Park Service and with the California Fish and Game Commission. The 1930 term extended for seven weeks between June 30 and August 15. The term corresponds in dates with that at the University of California Summer Session with a seventh week added used in making studies at timberline.

Two years of college work or the equivalent is required of those registering. There is no tuition but there is a registration fee of $5.00. Each class has thus far been limited to twenty. Students are housed in a circle of tents where they live together and learn from each other.

As the name implies, emphasis is placed on intensive field work and each student is expected to know and identify all of the more common Yosemite trees, shrubs, wild flowers, insects, fishes, amphibians, reptiles, birds and mammals. The work is of university grade although for the present no university credit is offered. A certificate showing that the work has been satisfactorily completed is issued. The course is not a duplicate of university summer work but is supplementary thereto, for it stresses first-hand information gained from the living thing itself. Field observation and identification occupies sixty per cent of the student's time.

Graduates of this school have often said that the work proved the most useful and enjoyable they had ever taken. Many graduates are now filling positions as nature guides in various summer camps.

Some research activities have been carried on centering about the ecology of the Yosemite National Park and about nature education methods in a national park.

The school has the use of one standard moving picture projector, two stereopticons, two standard moving-picture films and over three hundred lantern slides.

Application for admission should be addressed: Park Naturalist, Yosemite National Park, California.

THE AMERICAN SCHOOL OF WILD LIFE PROTECTION AT McGREGOR, IOWA

L. H. Pammel, Ames, Iowa

The American School of Wild Life Protection at McGregor, Iowa, was founded in 1918 by the Rev. George Bennett of Iowa City with the cooperation of the Iowa Conservation Association and the people of McGregor, Iowa.

The original faculty of the school consisted of George F. Kay, L. H. Pammel, B. Shimek, LeRoy Titus Weeks, George Bennett and Harry C. Oberholser.

The activities of the school consist of field trips and lectures, some of the former extending to one of the forty or more state parks in Iowa. Others include visits to the islands, lakes and streams in the vicinity of McGregor where the wild life is studied.

Dr. W. T. Hornaday has taken a strong interest in the school since it was started and has sponsored some of its activities. Many of the colleges of Iowa have cooperated through the services of some of their faculty members and in other ways.

The twelfth annual meeting was held from August 4th to 16th, 1930, at McGregor.

The school is being incorporated as a non-profit making organization with a board of directors about half of whom live in Iowa. Others include William Finley of the American Nature Association, T. Gilbert Pearson of the Audubon Societies and others.

The chairman of the executive committee is F. G. Bell of McGregor, Iowa.

THE NATURE LORE SCHOOL

In 1920, Dr. William G. Vinal organized the Nature Lore School at his girls' camp primarily for the purpose of training nature counselors for service in summer camps. The school was held for the last week in June just before the opening of the summer camps. While the school was designed for the needs of summer camp work in nature, it was patronized by teachers, scout leaders and many not immediately interested in camp work.

Dr. Vinal remained in charge of the school until he went to Western Reserve University where he founded the Nature Guide School in 1928. The Nature Lore School was conducted under the auspices of the Camp Directors' Association in 1924. It was held at various places during the years following Dr. Vinal's release of his girls' camp and in 1927 was held at Camp Andree, Briarcliffe Manor. In 1929 responsibility for the activities of the school were assumed by the Coordinating Council on Nature Activities with Dr. Bertha Chapman Cady in general charge. In 1929, it broadened the scope of its activities holding a session in New England and another in West Virginia. In 1930, the name The Nature Lore School was discontinued and the Nature Training School of the Coordinating Council on Nature Activities appeared. An account of this school is given with that of the Coordinating Council.

Even though the Nature Lore School is no longer existent, its influence has been such that this account is given for the benefit of those who wish the information as a background for other accounts.

NATURE GUIDE SCHOOL

of the

School of Education of Western Reserve University

W. G. Vinal, Director

The Nature Guide School of the School of Education of Western Reserve University was founded in 1928 as a summer school which was organized for the purpose of training teachers who wish to enrich their program, of playground leaders who are interested in directing nature clubs, of scout and camp-fire naturalists, nature counselors for summer camps, community and park nature guides, of parents who wish to be prepared to meet the nature problems in their own family, and of nature hobbyists who wish to broaden their training.

The school is unique among nature schools in that it offers considerable practice in the directing of these activities in the social life of a resident group of children known as the Outdoor Girls.

The school offers courses of collegiate grade in cooperation with the department of biology of Western Reserve University. Credit is given towards a degree and special certificates are issued to those completing approved work. Opportunity is offered for training in horsemanship, camping and pioneering under expert leadership.

The school uses the plant of Western Reserve Academy at Hudson, Ohio, twenty-five miles from Cleveland and twelve miles from Akron. Here are suitable and comfortable buildings on a tract of land comprising thirty-one acres of wooded campus and five hundred acres of farm land and woodland.

Total expense for the six weeks' course including room, board and tuition but excluding travel is $150.

The staff of the school for 1930 included eighteen well-known naturalists headed by Dr. W. G. Vinal, who was the founder of the Nature Lore School. The school in 1930 was in session from June 21st to August 1st.

Inquiries relative to the school may be directed to Dr. W. G. Vinal, School of Education, Western Reserve University, Cleveland, Ohio.

THE ALLEGANY SCHOOL OF NATURAL HISTORY

Robert E. Coker, Director

The Allegany School of Natural History was opened July 5, 1927. It was established to meet the need for outdoor experience and training in the study of natural history, an essential supplement to the conventional lecture room and laboratory instruction in botany, zoology, physical geography and geology as commonly offered in city schools and in colleges.

Students and staff live in the midst of wild nature, enjoying the wholesome experience of life in the forest together with unusual educational facilities and stimulating associations. The central principle of instruction at the school is to guide the student in personal observation in the field, in studies in the laboratory and in reading, with a view of enabling him or her to develop powers of observation, thought and judgment.

The school is conducted by The Buffalo Society of Natural Sciences in cooperation with The New York State Museum and affiliated with The University of Buffalo. It is located in the Allegany State Park at Quaker Bridge, New York. Here some 65,000 acres of land are under the care of the State where one may on occasion see wild bear, deer, raccoon, porcupines and other interesting mammals. There is a broken topography making the place interesting to geologists as well as to biologists. There are forty cabins including a main school building which is forty-eight by ninety-six feet in size. Each cabin accommodates two students and has electric lights and a stove.

Credit for work done is given in the College of Arts and Sciences of the University of Buffalo in the amount of three semester hours for each full course completed. The school has the approval of the Board of Regents of the New York State Education Department. A student is expected to register for two full courses.

The Allegany school has accommodations for fifty students and this number will not be exceeded until facilities are increased. The total expense outside of traveling expense of the seven weeks' session but including board, lodging and tuition is $150.

It is evident that the school has a function of service extending beyond its immediate relations to teachers and professional or amateur naturalists. New York State has entered upon an extensive program for the development of state and county parks, providing a leadership which will be followed in some measure by other states. The most profitable enjoyment and use of these parks call for educational leadership in the interpretation and management of these areas of wild nature. Knowledge of the natural history of our parks is certainly one of the essential conditions for the proper guidance of the public in the appreciation, use and preservation of these resources.

Communications intended for the Allegany School of Natural History may be addressed to the Buffalo Society of Natural Sciences, Buffalo, New York, or to the Director of the school, Dr. Robert E. Coker, Professor of Zoology at the University of North Carolina, Chapel Hill, North Carolina.

The fourth session of the school was held between July 5th and August 23rd, 1930.

AMERICAN NATURE ASSOCIATION TRAVEL PARTIES

Any adequate treatment of leadership training in the field of nature education must recognize the service being rendered by the American Nature Association in the travel parties which it organized as an experiment in 1929 and continued in answer to a demand in 1930.

These trips were inspired by readers of *Nature Magazine* who made inquiries as to whether or not they might be permitted to join the expeditions of the Association whose experiences were recorded in the magazine. The requests were so many that it was impossible to satisfy all and accordingly separate parties were organized at different times during the summer season to fit the opportunities of those who wished to join. Since the expedition of the American Nature Association into Glacier National Park created the demand, the first organized travel party was made into the same park. Three groups made the journey and demanded that the opportunity for further travel be given another year. On the trips through the park, special privileges were extended to the members of the party and the best of experienced leadership was made available to assure a maximum of educational return for the time and energy spent.

The trips for 1930 under the auspices of the Association included visits to Glacier National Park, Jasper National Park in Canada, the coast district of British Columbia, the Pueblo Indian country of New Mexico, the Grand Canyon, Zion and Bryce National Parks and the Yellowstone National Park.

It is possible that these trips may play an important part in the educational program which seems certain to develop as a standard activity of the National Parks Service.

Information relative to the trips may be secured from the American Nature Association, Washington, D. C.

THE CHARLES LATHROP PACK FELLOWSHIPS IN NATURE EDUCATION AND FORESTRY

In 1928, The Charles Lathrop Pack Forestry Trust established at Cornell University, The Charles Lathrop Pack Fellowships in Nature Education and Forestry. The purpose of these fellowships was " to encourage research of graduate grade in the fields of nature education and forestry concerned particularly with the determination of methods and practices affecting the education of the public in the use of its natural resources."

During the years 1928-29 and 29-30 the holders of these fellowships have been working on four problems concerned essentially with nature and forestry education.

Professor Karl Hazeltine of San Jose California State Teachers College made a survey of the practices in the teaching of nature study in teachers colleges and normal schools from New England to Colorado. These studies were made by correspondence and by personal visitation and were followed by evolving a test involving forestry content which was submitted to a large number of children in cities and in urban communities. In addition, these tests were submitted to teachers in training to determine the degree to which the ability of the prospective teachers could excell the students whom they would be called upon to teach. The results are nearly ready for publication.

Professor Robert Johnson of the Oneonta New York State Normal School held a fellowship in 1928-29 and has made progress on a problem concerned with determining the factors which make a community conscious of the value of the natural beauty of the immediate environment. Communities of three sizes have been worked with, using in each group cities which have and those which have not shown evidence of a desire to preserve and use attractive areas immediately adjacent to the communities. The study has involved examination of city budgets for a considerable number of years back and has concerned itself with biographical notes on the individuals in the communities who have been leaders in the more important projects centering about the forests and parks and wild areas of the region. The most convenient units to work with have been those with a population of between ten thousand and thirty thousand. The study is not yet completed.

Professor George Friedrich of the St. Cloud, Minnesota State Teachers College has held a fellowship under this grant and has been working on a problem identified with the methods and advantages of the study of nature in the field by pupils in the grades and by teachers in training. The cooperation of a considerable number of teacher training institutions between New England and Minnesota has been enlisted in making the experiments involved in this study. A technique for producing useful data has been developed and the results should be worth while to those who examine the data and to those who cooperate in its production. It is hoped that when the study is completed that helpful recommendations concerning studies made in the open may be made to teacher training institutions.

Miss Jessie McNall in charge of nature study at the Potsdam New York State Normal School held one of the fellowships in 1929-30 and has made progress identified with the merits of teaching of nature by the means of motion pictures as compared with the study of actual living things. These studies are being continued in connection with Miss McNall's work at the Potsdam Normal School.

The studies made by Professors Johnson and Friedrich have been made with the guidance of Professors Palmer and Hosmer of Cornell University. Professor Hazeltine worked under the guidance of Professors Palmer and Moore. Miss McNall worked under the guidance of Professor Palmer and Professor Kruse.

The fellowships are to be continued through 1930-31 and 1931-32. All holders of the fellowships have been holders of Master's degrees who have in addition had at least two years or more of successful experience on the faculties of teacher training institutions.

Fellowships for 1930-31 have been awarded to Professor Robert Greene of Geneseo New York State Normal School, Leo F. Hadsall of Trenton, New Jersey, and Miss Antoinette Press of Miami University.

Individual holders of the fellowships have received financial support in excess of one thousand dollars for a year's study and most have made progress towards the securing of an advanced degree during the period the fellowship was being held.

Applications for the fellowships should be made to Professor E. L. Palmer, Fernow Hall, Ithaca, New York, before the middle of March preceding the award. Professor Palmer is directing these researches as Professor of Rural Education at Cornell University and in his capacity as Director of Nature Education of the American Nature Association.

A NATURE EDUCATION SURVEY OF THE UNITED STATES

E. Laurence Palmer

This study is a sequel to the survey published in the last edition of *The Nature Almanac.* Like its predecessor, it is a further development of studies started by M. R. Van Cleve of Toledo and carried on by Clelia Paroni of Berkeley, California, and by others. A summary of these preliminary studies appeared in the 1927 edition of the *Almanac.*

The present study is based upon rather exhaustive returns from state departments of education, universities, teacher-training institutions and school administrators. Each state department of education was asked by means of a blank form to indicate the status of nature and science education in the appropriate state. The data received had a bearing on nature and science work in the elementary and secondary schools and gave indications of the science requirements associated with various types of certification. Where there were state adoptions of text-books, these were reported and had a bearing on the report given here for the various states. It seems to be evident that in a large number of states, state programs are not necessarily mandatory with the larger communities of the commonwealth. In fact, the state outlines are generally used primarily by those communities in which there has been no other particular program developed. Not a few communities in states having a state program use the programs of other states. In many other cases, the state programs are written with such an organization that their use in rural schools is practically impossible. This is true of some of the states in which the rural element predominates. It is true that many state outlines merely follow programs which have been in use in other states. Few readers of this book will care to read the programs of all states. It is suggested therefore that those wishing to get a survey of the various types of programs acquaint themselves with the programs outlined for the following states: California, Connecticut, District of Columbia, Illinois, Maine, Minnesota, Missouri, New Jersey, New York, Pennsylvania, Rhode Island, West

Virginia and Wyoming. For those interested in programs suitable for use in rural and urban school systems it is recommended that they become acquainted with the programs of New York, Minnesota, West Virginia and Wyoming.

In the present survey, the quibbling debate between the use of nature study or elementary science has not been recognized. It is believed from an examination of the programs at hand that much that is listed under elementary science might well be listed as nature study and much that is listed as nature study might be considered as elementary science. Possibly the program for West Virginia draws as sane a difference as any between the two when it states that nature study is the study of things and implies that science may include in addition to this the study about things. In either case, it may be recognized that there is appropriate material for use in the elementary and the secondary school levels.

The present survey involves consideration of the offerings of most of the important colleges and universities and all of the state teacher training institutions. Generalizations from the one hundred and eight returns from state teachers colleges have been given on pages 116-137. Items of specific interest are given in the accounts of the various states following. Of the larger universities, it seems that the problems of teaching science in the elementary schools have been recognized by such universities as Cornell, Chicago, Columbia, University of Pittsburgh, Western Reserve University, University of Minnesota and Pennsylvania State College. They apparently have not been recognized by Harvard, Leland Stanford, University of Washington, Ohio State University, University of Missouri and University of Michigan. These last named universities offer helpful work for the teaching of science at the secondary levels while the first named group recognize and support a service for both the elementary and secondary levels.

Return post cards were sent to every city superintendent listed in the Educational Directory published by the United States Bureau of Education. These cards called for much more data than was the case when a previous survey was made. The returns were decidedly interesting and pointed out wide divergence of practice in the various parts of the country. Those interested in developing programs for use in cities should examine with some care the accounts here given for Austin, Texas; Los Angeles, California; Pittsburgh, Pennsylvania; Minneapolis, Minnesota; Detroit, Michigan; Berkeley, California; Denver, Colorado; St. Louis, Missouri; Washington, D. C., and New York City. It is believed that the practices in other cities duplicate or vary but slightly from the practices of one or another of the above named cities. The most commonly mentioned difficulty mentioned by the superintendents as a barrier to successful science teaching was the scarcity of well qualified teachers to handle science subjects. Those who face this difficulty might find a solution for the problem in the unique organization followed at Austin, Texas. Those interested in problems concerned with the organization of content rather than of the teaching staff will find much food for thought in an examination of the programs in vogue at the other cities mentioned, particularly in Rochester, St. Louis, Minneapolis, Los Angeles and Pittsburgh. It might be mentioned here that the Rochester program is by no stretch of the imagination considered as being perfected as yet. It is interesting to note that but one superintendent indicated that expense was a barrier to successful nature and science teaching in the schools. Apparently the two great obstacles to be overcome are those concerned with teacher training and curriculum planning. Obviously it seems absurd for one superintendent to say that he cannot solve the time element sufficiently to offer more than ten minutes a week to nature work when others find it quite convenient to give two hundred or more minutes a week in each grade. Each has the same amount of time at his disposal. Also it seems rather futile to pass state laws requiring the teaching of the work in all schools when some of the states with the most stringent laws apparently are doing much less work than those with no legal requirements on the subject. If this survey helps solve administrative or other problems through pointing out the practices in force in various places it will have served its purpose.

So far as possible the writer has tried to present an unbiased viewpoint of the situation. He has had personal teaching experience in New York, Iowa, Utah and California and has observed practices first hand in many other states. In addition, he has had the reactions from trained observers in many other states to guide him and has had the cooperation of many students and professional colleagues in the field. To all those who have made this survey what it is he admits his obligation.

ALABAMA

The Course of Study for Elementary Schools of Alabama suggests nature study work for the first three grades of school. It is suggested that these three grades be taught as a unit possibly, or more specifically that these first grade children make the simplest of acquaintance with the various factors in their environment. The second grade children are asked, in addition to what they got in the first grade, to be able to recognize and show a fairly definite knowledge of at least four birds, four wild flowers, two house plants, four growing garden vegetables and four trees. The third grade requirements ask, in addition to what has been done, that the children be able to recognize four birds, male and female, four wild flowers, four garden flowers, two pot plants, four garden vegetables, two injurious garden insects, two fruit trees and four forest trees. In addition to this mere recognition, there is the added requirement in the third grade that the child show some definite knowledge of the food, habits, nests and uses of the birds studied; how to raise the wild flowers, potted plants and vegetables studied; how fruit trees are produced, grafted and protected from insects; the life histories of the garden or orchard insects and how to get rid of them and the uses of the forest trees studied.

We have no records of what is being done in the teacher training centers of Alabama except that at Birmingham-Southern College, Dr. W. A. Whiting seems to be developing a center of interest. He writes that a slogan in the public schools of Birmingham for 1929-30 was " character building through nature " and that the college with which he has been identified is being called upon to train many of the teachers identified with the program. Dr. Whiting writes also that there seems to be an increasing interest in nature education on a state wide basis. In spite of this encouraging information, we have almost no returns from Alabama communities indicating any considerable interest in the work. The only two answering our inquiry are these:

Bessemer.—Nature and science work has a definite time requirement from the third through the ninth grades. In the third, fourth, fifth, sixth and seventh grades, a hundred and fifty minutes per week is required and in the eighth and ninth, two hundred and twenty-five minutes. The work in the lower grades is freely correlated with geography and history and mimeographed materials are provided to help the teachers succeed in the field. Field and garden work is undertaken by about ten per cent of the seventh and eighth grades. Indoor laboratory work is open to all of the children from the third through the twelfth grades. There seems to be some difficulty on the part of the administration to secure adequately trained teachers and adequate physical equipment.

Selma.—There is no special science supervisor in the elementary grades but Mrs. S. O. White is responsible for its success at these levels. At the junior high school levels, J. F. Egger assumes responsibility and at the senior high levels, L. E. Snyder. There are no definite time allotments for nature or science work below the sixth grades and only forty-five minutes a week each in the sixth, seventh, eighth and ninth grades.

ALASKA

The course of study for the schools of the Territory of Alaska provides for the instruction in nature study in the elementary grades of the public schools. The present edition of the " Manual and Course of Study for the Elementary Schools of Alaska " was printed in 1926. A section is devoted to work in nature study although the suggestions are of a general nature. The outline does no more than to bring the subject to the attention of the teachers with references as to where additional information may be found. The text referred to is Mrs. Comstock's " Handbook of Nature Study."

Nature study work in Alaska has been stressed chiefly in the first six grades. In rural schools with a small enrollment, all children are considered as of one grade. Local material is always stressed in the nature study work. At present, much stress is being put on the study of the forests of Alaska. Prepared outlines helpful in this study are made available to all elementary grades.

The Territorial Department of Education has recognized science and nature work as a school activity of both elementary and high school level since 1917. Outstanding work in nature education has been done at Ketchikan. The Commissioner of Education maintains a supervision of the science and nature work taught in the Territory requiring the teaching of hygiene and nature study below the seventh grade, of physiology and nature study in the sixth and seventh grades and of general science followed by one major science generally biology in the grades of the high school. Provision is made for grade grouping in the territorial outline and the program is mandatory upon the rural schools.

The time allotment in the territorial program and general divisions observed are as follows: 1st grade to 4th grade, thirty minutes each, health and nature study; 5th and 6th grades, twenty minutes each, nature study and hygiene and sanitation; 7th grade, twenty-five minutes, physiology; 9th grade, forty-five minutes, general science; 10th grade, forty-five minutes, biology; 11th and 12th grades, two hundred and twenty-five minutes per week in physics or chemistry.

Ketchikan.—Superintendent A. E. Karnes is responsible for the work in nature and science at the elementary school levels, and George V. Beck of the work at high school levels. The weekly time allotments required are as follows: First grade, thirty minutes; second, thirty; fourth, forty; fifth, sixty; sixth, sixty; seventh, sixty; eighth, sixty, and ninth, three hundred minutes. The soil and climatic conditions make the use of gardens as nature education media difficult. Some work in the lower grades calls for correlation of science work with language.

ARIZONA

We have no record of a state-wide program in nature or science work in Arizona. There does seem to be a growing tendency on the part of the teacher training institutions to turn out a better prepared product to handle nature education in the schools, however.

The normal school at Flagstaff which formerly offered only two years of work has become a four-year teachers college recently and the work in nature and science there has accordingly been increased. It is at present under the guidance of Chester F. Deaver, Professor of Biology. The school graduates about seventy-five students a year who will be going into the elementary school service. The preparation offered in the field of science at this institution compares favorably with that offered in other subjects in the same institution so that it may be expected that its graduates will be reasonably well prepared. A course combining content and method is required of graduates. This calls for two hours of lecture and three hours of field work per week. A college bus is available to assist in making long field trips possible. Two full-time instructors and two assistants are employed to teach the science work to prospective elementary school teachers.

We have little new material to add relative to the situation in the various communities of the state. What we have follows:

Miama.—Science and nature work in the first six grades is the responsibility of Lucille Kelley, a teacher. At the high school levels, it is the responsibility of J. H. Marschall. A mimeographed outline is used. Grades two to six are grouped in their work and correlation with geography and history is common. Laboratory work is possible in the schools following the platoon system.

ARKANSAS

Nature or science work has been recognized as a school activity by the State Department of Education of Arkansas since the beginning of standardized high schools in 1911. It has been recognized in the elementary schools for forty or fifty years when by legislative enactment it became compulsory to teach physiology and geography. The most important institutions in the state to have fostered this work in the public schools have been the Arkansas State University and the state teachers college. Supervision of the state program is cared for not by special science supervisors but by W. F. Hale, state rural school supervisor, and G. R. Owen, state high school supervisor. This supervision consists of visitation, the supervision of teachers credentials and text-book selection and adoption and correspondence.

Some training in the teaching of nature study or science is at present required of the average elementary school teacher. Teachers in service are helped in their work by the State University that furnishes slides and reels for visual instruction. The present state requirements call for nature study in grades one and two and geography and physiology in grades three to seven inclusive. In the seventh and eighth grades physiology, geography and elementary agriculture are required and the curriculum for the high school sets up general science, biology, chemistry and physics as approved subjects in science. Two sciences are required in a four-year classified high school. The time required for teaching science above the eighth grade is three hundred and fifteen minutes per week.

The state outline was prepared by H. L. Turner, rural school supervisor, for use in all public elementary schools. Skilling's, "Nature-study Agriculture" is the text adopted for use in the seventh and eighth grades.

Drawing and art courses outline topics suited to the different months of the year and involve experiences with flowers, grasses, leaves, seeds, vegetables, fruits, mammals, birds and general landscape. Fire prevention is required to be taught in the elementary grades.

The state teacher training institutions seem to be increasing their interest in and attention to nature work. Nature study courses and methods in geography courses are required in the two year certificate curricula from the state teachers college. This institution offers eleven courses totalling thirty-nine hours in geography under the leadership of H. L. Minton. Methods courses in junior and senior high school science courses are also offered and additional subject matter courses in science are professionalized to some extent. The State Department of Education requires six semester hours of work in nature study for the professional primary and professional elementary certificates.

There are few reports from the individual communities of Arkansas to indicate the status of the work there. Those available follow:

Fort Smith.—Minnie Pohatski is responsible for the nature study and science work in the elementary grades. Thirty to fifty minutes per week are allowed to nature work in the first, second and third grades. The work is correlated freely with that in geography.

Stuttgart.—Mrs. G. H. Collar is in charge of nature work in the first six grades. The time allotments required are as follows in terms of minutes per week. First and second grades, sixty minutes each; third and fourth, one hundred twenty each, and fifth and sixth, one hundred eighty each. Free correlation with art work is recognized though there seems to be some objection to the practice by staff members.

CALIFORNIA

The official status of nature study and elementary school science in California is probably best expressed in the California Curriculum Study prepared by Bagley and Kyte. Bulletin 1 of this study was published in 1925. The new law requires the teaching of twelve subjects in the elementary schools and in addition requires three electives. Nature study or science is not included in the list of twelve compulsory subjects though the work is frequently and probably generally recommended as the first of the three electives required. Doctor Kyte recommends the following weekly time allotments in science for the different grades: first, twenty-five minutes; second, twenty-five; third, twenty-five; fourth, twenty-five; fifth, twenty; sixth, twenty; seventh, twenty; eighth, twenty-five. Since the establishment of the school system in California in 1851, nature work has had a varied existence, whereas other subjects have been taught continuously. Mrs. Comstock, David Starr Jordan, Bertha Chapman Cady and others exerted no little influence on nature work in California in the past. In more recent times, Dr. Harold Bryant, now of the National Parks Service, Vaughan MacCaughey of the *Sierra Educational News,* Dr. Charles Lincoln Edwards of the Los Angeles Public Schools and Clelia Paroni of the Berkeley system have with Professor F. L. Griffin done much to help the work carried on in the regular teacher training colleges. Miss Helen Heffernan, the State Supervisor of Elementary Education is much concerned with the success of nature work in the state and hopes to develop a program which will insure better preparation of teachers along nature lines, and consequently better nature work in the schools. In spite of the fact that nature work is not given the official sanction in the elementary schools that it enjoys in some other states it can probably be said that no state west of the Mississippi probably recognizes the worth of nature education more than does California. There are communities large and small where the prominence given the work is probably not exceeded anywhere in the country. There are three counties, Monterey, Fresno and Sonoma that require the work definitely in the schedules and employ county supervisors of nature study. The number of cities employing full time nature supervisors is large, but Californians live out-of-doors for most of the year and one would expect unusual support of an out-door program. Until recently California teachers in service have not enjoyed the opportunity for improvement available in other places. Professor O. J. Kern of the University of California at Berkeley has been responsible for some splendid outlines closely integrating the work with landscape gardening but in practically all of his contributions the utilitarian viewpoint has seemed to be paramount, Recently valuable publications helpful in nature education have been coming from the Fresno State Teachers College and from the San Jose State Teachers College. The Fresno publication is known as the *Nature Study Bulletin.* It is now beginning its sixth volume, each volume totalling about fifty pages of closely printed material. The San Jose periodical is known as *Western Nature Study.* It is a more ambitious undertaking appearing quarterly. The first number was devoted to the frogs, toads and salamanders of California. It is splendidly presented on expensive paper with striking half-tone illustrations. The Fresno bulletin is under the joint responsibilities of the departments of agriculture and biology. The San Jose bulletin is prepared by Dr. Gayle Pickwell and Karl Hazeltine of the teachers college staff. Other interesting and useful periodicals appear from the Los Angeles school system for the most part from the pens of Dr. Edwards and Mr. Ross. Dr. Loye Miller of the University of California at Los Angeles produced much valuable nature study material in the past but has confined his energies in recent years to more specialized fields of science.

California has outstanding museums that have done much to help in nature education. Among the more important of these are probably those at San Francisco, Berkeley, Los Angeles, San Diego and Santa Barbara.

The California Fish and Game Commission, see pages 80-84, has also recognized education as an obligation and has helped through lectures and through its bulletin, *California Fish and Game.* Apparently, its philosophy is summed up in the expression "Legislation plus education equals conservation."

The strength of juvenile organizations such as the Boy Scouts, Camp Fire Girls and Girl Scouts represented in California augurs well for an appreciation of nature by influential Californians of the future. A public sentiment such as exists for the purchase and support of public parks does not make one pessimistic of the future. A state so abundantly patronized by tourists as is California can do much to encourage or discourage on a broad scale various practices in public education not possible in states less favored.

Strong nature study clubs interested in nature in general or in more limited systematic groups are to be found generally in the larger centers of California. The Nature Study Club of Southern California and the California Audubon Society are among the better known of these. Each has a large membership and loyal support on the part of those who might be expected to be interested.

The work at California Teachers Colleges is recorded below under Chico, Fresno, San Francisco, San Jose and Santa Barbara.

Reports of some of the communities of the state of California follow:

Berkeley.—Clelia Paroni is the nature supervisor of the first six grades. The course followed has been printed, revised and reprinted and is continuing to be revised with experience. The time allotments for these grades follow: First, second and third grades, seventy-five minutes per week each; fourth, fifth and sixth grades, fifty minutes a week each. Forty minutes per week are allowed as elective in the seventh, eighth and ninth grades. Correlation is most frequently made with language work. Field and garden work is open to about one-third of the fourth, fifth and sixth grades but difficulty in conducting trips has been found because of the large size of the classes. In addition, it has been found difficult to obtain teachers trained to do this sort of work. The work is not designed for the purpose of carrying out set plans, but plans are prepared in the hope that they may assist in carrying out the solution of the problems that may arise. The work is designed to help develop certain habits and attitudes as well as to provide certain knowledge. The making of the course has involved the cooperative effort of local teachers, principals, business men and university professors. Emphasis on the various fields of science is not given to particular grades.

Brawley.—Nature and science work in the first six grades is a responsibility of Dean Richmond and of P. E. Palmer at the high school levels. The weekly time allotments are as follows: First, second, third, fourth and fifth grades, twenty minutes each; sixth, seventh and eighth grades, forty minutes each and ninth grade, two hundred and thirty-five minutes. Correlation with geography is commonly practiced. There has been some difficulty in preparing a course of study suitable to the local needs.

Burbank.—Miss Moreland Preston, the general grade supervisor, is responsible for nature and science work at the lower grade levels.

Chico.—At the Chico State Teachers College, W. L. Johns is in general charge of the work. Six faculty members here teach science to prospective elementary school teachers. About a hundred graduates of the school enter the elementary field each year. The kindergarten, rural and elementary teachers graduating here have twelve hours of preparation in the field of nature and science and methods of teaching these subjects. Probably, about a half of these will be called upon to teach science in some form or other after graduation.

Glendale.—Helen Reynolds Chamberlain is supervisor of nature study and elementary science at Glendale. The time allotment per week calls for twenty-five minutes in each of the first three grades and twenty minutes in each of the next three. A mimeographed outline is followed and there is frequent and definite correlation with reading, language and art. Provision is made for field and garden work in the fourth, fifth and sixth grades, where each child is required to plant and care for a box of flowers at home. These boxes are exhibited in the spring. Provision is made for indoor laboratory work in the fourth, fifth, sixth and eighth grades. The limited time allotment seems to be a serious obstacle to the most successful work in the field of nature and science as it makes field trips ordinarily impossible.

Fresno.—At the Fresno State Teachers College, George W. Graves is head of the department of agriculture and nature study. He and his staff have shown a genuine interest in nature study at the lower grade levels. Seven faculty members are employed in teaching science to prospective, elementary school teachers and the school graduates yearly about one hundred and fifteen students at least a half of whom will in all probability be called upon to teach elementary school science in some form or other. Arlee Nuser is in charge of the work done in supervising science in the practice school. Generous use of laboratory and field work is made. About one-third of the biological materials studied are living when examined. The Sierra Summer School at Huntington Lake, California is a responsibility of the college and during 1930 held a session from June 30th to August 8th. All courses offered here in the field carry the same credit as do courses offered in the regular session.

Long Beach.—Since the last issue of the *Almanac,* nature education in general and at Long Beach in particular has lost an able leader because of the untimely death of the former supervisor of nature study, L. W. Welch. Mr. Welch's place has been taken by James M. Stephenson who holds the position of director of agriculture, general science and nature study in the elementary school and junior high school. The work at the senior high school levels is the responsibility of H. B. Gray, Mrs. Gladys March and Lena Higgins. Time allotments for the city are as follows: First grade, fifty minutes a week; second and third, twenty-five each; fourth, fifth and sixth, twenty each; seventh, ninety one-half year, and one hundred thirty-five the other; eighth, two hundred and twenty-five. An extensive printed outline serves as a guide for the work of the first six grades and mimeographed helps are available for the upper grades. Some correlation is made possible with the social studies, English, art and character education. Gardens are available for use by ninety-five per cent of the fifth grade children and indoor laboratories are available for all of those of the seventh and eighth grades. Obviously, the limited time allotment is a serious handicap to the work planned.

Los Angeles.—Dr. Charles Lincoln Edwards is the nature supervisor and has seven assistants to handle nature problems through approximately three hundred schools. Each assistant is a specialist in some systematic field of science and becomes a curator of that department. Nature guides are printed and issued weekly on a plan which will cover the important fields in six years. These materials are not graded but are expected to be adapted to grade use by the teachers. A nature study center is maintained where teachers may find additional help with their nature problems. Emphasis in all grades and in all the schools of the city is given to a main topic each week. The time allotments per week call for thirty minutes work in each of the first eight grades though sixty minutes is permitted. Some grade grouping is suggested after a plan including the first and second as one group, the third standing alone and the fourth to eighth being grouped together. Field and garden work is possible in about seventy per cent of the fifth and sixth grades and the same holds for the indoor laboratory work. Extended excursions are made at selected intervals calling for attendance by large numbers of children under guidance. Elementary agriculture is handled in a separate department and grade supervisors of the city school system have an influence on what is actually taught. There are many strong nature study clubs in the city and the presence of the Museum of Natural History and the State University all lend excellent opportunities for most successful work.

Modesto.—No specific supervisor of nature study is provided for the elementary schools though there is a time allotment calling for fifteen minutes a week in each of the first three grades, twenty minutes each in the fourth, fifth and sixth and thirty minutes each in the seventh and eighth grades. Mimeographed outlines help in the work which is correlated with art, hygiene and civics where this seems desirable.

Monrovia.—W. E. Steiner is science supervisor of the sixth to ninth grades, but there is no science supervisor below these grades. Thirty minutes work a week is required in the sixth, the seventh and the eighth grades. Field work is carried on in the sixth grade and frequent correlation is made with geography.

Oakland.—Elementary science, principally nature study is an integrate part of the elementary school program. Fifty minutes a week is required in each of the first four grades and seventy-five minutes in the fifth and the sixth. Correlations are made principally with art, English and the social studies. Correlation is insisted upon and promoted. Wide choices within the nature field are permitted but the semester programs are filed with the principals to assure certain standardization and a coherent program. Lewis B. Avery is the supervisor responsible for the science work in the school system. The program advocated by him follows rather closely that published in the Fourth Yearbook of the Department of Superintendence of the National Education Association. Attendance by teachers at lectures, college extension courses and field trips is urged. Considerable regular additions are made to the science libraries in the schools. Municipal summer camps are maintained with Brighton Cain serving as boy scout nature supervisor. Mr. Cain is adequately trained and qualified to do a superior piece of work. The junior high schools have regular courses of study for the seventh, eighth and ninth grades with textbooks provided and laboratory work required. The presence of Lake Merritt in Oakland may be taken as evidence of the fact that the community is conscious of the value of wild birds as living creatures. Here in the sanctuary hundreds of wild ducks may be fed from the hand within the very shadow of skyscraper apartments.

Ontario.—Nature and science work is offered and required in grades three to eight inclusive. The time allotments are as follows: Third, thirty minutes weekly; fourth, forty; fifth, fifty; sixth, seventh and eighth, sixty minutes each.

Palo Alto.—Though nature study is not required in the elementary schools of Palo Alto, teachers who are interested are permitted to give instruction in the subject. According to Superintendent A. C. Barker there seems to be a real difficulty involved in teaching nature study as it has not been included in the training of the teachers of the system. As a result many teachers dislike the subject and if they teach it at all do so in a perfunctory manner, after reading it from a text book. The difficulty in securing trained teachers in this subject, according to the superintendent is much greater now than it was twenty-five or thirty years ago. It would seem from this comment by Superintendent Barker that while Palo Alto has been justly famous because of its nearness to Stanford University that university has not extended its influence to the children who play about its grounds. A letter from the School of Education of Stanford University states that the institution is doing nothing for the training of elementary school teachers. This is particularly unfortunate from the standpoint of nature education because of the splendid reputation as a science center which the university holds.

Pasadena.—Frederick H. Shackelford is the science and nature supervisor for the first six grades at Pasadena. The time allotment per week required calls for twenty-five minutes in each of the first four grades and fifty minutes each in the fifth and sixth. Aside from these requirements, however, there is no limit within reason as to the amount of time which may be spent on the subjects. Many teachers by correlating the work with other subjects give regularly as much as twenty-five or thirty minutes a day even in the lower grades. One teacher at least gives about ninety minutes a week instead of the fifty allowed. Very little indoor laboratory work is given in the first six grades as the outdoors furnishes the ideal laboratory and as much time as possible is spent in the open. In the junior high schools, general science and biology are given in the eighth and the tenth grades with considerable indoor laboratory work. There is no single supervisor of science in the high schools, each school having its own departmental head. An extensive and useful program has been worked out for the elementary grades with the thought that the teacher may exercise freedom in its use to adapt the work to the opportunities offered in the various situations. Private home collections have been encouraged through the use of "nature boxes" which at regular intervals are entered in exhibits. Honor certificates are presented to pupils attaining certain standards in nature study and agriculture. In this system, as in many others, one of the obstacles to most successful work seems to lie in the direction of inadequately trained teachers.

Pomona.—Charles M. Johnson is the nature and science supervisor of the first nine grades. The weekly time allotments required call for forty minutes in each of the first three grades, fifty minutes each in the fourth, fifth and sixth, one hundred and twenty in the seventh, one hundred and twenty to one hundred and sixty in the eighth and two hundred in the ninth. Mimeographed helps but no school gardens are provided. Correlation with English and geography is general.

Red Bluff.—Ora Combs is supervisor of the work in grades two, three and four in each of which there is a thirty minute a week time allotment required. No outline is followed in the work.

Sacramento.—Dr. Florence Billig and Esther Guthrie supervise the nature and science work in Sacramento public schools. The time allotments required are more generous than in many other places and are as follows: First, sixty minutes per week; second and third, sixty minutes each; fourth and fifth, eighty minutes each; seventh and eighth, two hundred minutes each, and ninth, three hundred minutes. Mimeographed outlines are available for helping the teachers. According to the most recent of these available for examination, the program calls for acquaintance with new species of the different groups in succeeding years without necessarily reviewing the old species. Certainly there is no segregation of the different sciences for the different years of early school experience. There seems to be a rather arbitrary selection of species for consideration.

San Francisco.—A new course of study in elementary science for grades four, five and six was published in August, 1929. The course basically develops an activity program in which science is closely and definitely correlated with geography, history, language, art, construction work, humane education and conservation. Three periods per week are assigned to elementary science in the fourth grade and two periods per week in the fifth and sixth grades. At the San Francisco State Teachers College, Lea Reid is the instructor in nature study. There are eleven faculty members there engaged in teaching science to prospective elementary school teachers. The course in nature study is required for graduation and considerable effort is made to get teachers to work in the outdoors with their pupils. The course in nature study is almost one of content exclusively, with little emphasis on method. Bibliographies for local and national use have been worked out for the prospective teachers. Lectures are accompanied with actual materials for study whenever this is physically possible.

Sanger.—J. L. Sloane is the supervisor in charge of science work in the elementary school and junior high schools. The weekly time allotments required are as follows: First and second, thirty minutes each; third, forty minutes; fifth and sixth, fifty minutes, and sixth, seventh and eighth, sixty minutes each. Some mimeographed material is used to help those needing it. The work is most commonly correlated with geography and English.

San Jose.—At the San Jose State Teachers College, Karl Hazeltine is in charge of the nature study courses. Nineteen faculty members in the science department are engaged in teaching science to prospective elementary school teachers. P. Victor Peterson, head of the department has given every encouragement possible to the development of work suitable for elementary school teachers and has been assisted by Dr. Gayle Pickwell who is editor of *Western Nature Study* previously commented upon. The college is excellently located for successful work in nature study and school gardens are available where needed. It would seem that San Jose may, with the cooperation of Fresno and San Diego develop considerable prominence in nature education on the west coast.

San Diego.—Current information relative to nature education in San Diego is not available. Attention must be called, however, to the work of Mr. Skilling of the San Diego State Teachers College, who is the author of "Nature-Study-Agriculture." A place of leadership is also held by the Natural History Museum at Balboa Park. The Museum extends its services considerably beyond the confines of the buildings it occupies.

Santa Ana.—Doris I. Schenck is the supervisor of nature work at Santa Ana. Time allotments call for sixty minutes a week in each of the first three grades and eighty minutes a week in each of the next three. Mimeographed outlines are available for helping teachers and correlation is made with work in language.

Santa Barbara.—Time allotments in Santa Barbara call for weekly expenditures in the grades as follows: Each of the first four grades, thirty minutes; the fifth and sixth, forty minutes each and the seventh, eighth and ninth, two hundred minutes each. Correlation with geography is common. At the Santa Barbara State Teachers College, no considerable emphasis is placed upon nature work. At the museum however a splendid collection is made available to the public in an exceptionally attractive manner.

COLORADO

Colorado has always been rather progressive in matters concerned with nature and science education. It was at the Denver meeting of the National Education Association in 1896 that the Department of Science Instruction of the National Education Association was organized. The standing of Denver in the educational field has been high and the Denver course of study for science at junior high school levels is looked upon as standard by many.

The state has, within its boundaries, the Rocky Mountain National Park which has drawn many visitors to the region. Some of these have been of the typical tourist type with little other thought than where they might go next but others have come with the purpose of carrying on serious study. The Rocky Mountain Biological Station at Gothic has been a center of serious study under the guidance of able scientists from many states. John C. Johnson, author of " Educational Biology " and A. O. Weese, prominent for years in the Ecological Society of America, have been among these. The 1930 session of this school was held between July 1st and August 9th. The Alpine Laboratory of the Carnegie Institution of Washington also makes its studies in Colorado. These are strictly of a research nature and the 1930 session was held at Manitou, Colorado, between June 1st and September tenth. The University of Colorado conducts a camp twenty-eight miles from Boulder near the Continental Divide and some 9,500 feet above sea-level. The program is sufficiently varied to be attractive to beginners, undergraduates and graduates in geology, ornithology, botany and limnology. The 1930 session at this laboratory was in two terms between June 23rd and August 29th inclusive. The fee for each term was $125 for all resident expenses. Besides these centers of serious study there are many private and semi-public camps offering varying degrees of nature education in the state. One interesting training center is the Mountain Extension Summer School at Palmer Lake, Colorado, which has for some years conducted successful sessions under the auspices of McPherson College, McPherson, Kansas. The Colorado State Teachers College at Greeley, Colorado, has also played a prominent part in summer work in nature education and has maintained a headquarters for this purpose at Camp Olympus, Estes Park, Colorado.

The Adams State Teachers College at Alamosa, Colorado, offers one required course aimed specifically for the training of elementary school teachers for work in nature and science education. In addition, they require a course in public health. The general course apparently combines method with content and covers work in astronomy, chemistry, physics and biology. Each of the sciences apparently is taught in terms of local needs. Vernon Lantis is in charge of the general course at Adams State Teachers College.

The communities of the state from which we have interesting returns are as follows:

Boulder.—A brief report states that science or nature work in a general sense is taught in the seventh, eighth and ninth grades and that biology is taught in the ninth. A note is added to the effect it is difficult for the administration to find time to teach all the desired subjects in the public schools.

Brighton.—Doris Adams, a principal is responsible for the science work taught in the lower grades and David Kyle, for that at the high school levels. The required time allotments for the grades are these: First and second, thirty minutes each weekly; third, fourth and fifth, forty minutes each. Correlation with geography is frequent and mimeographed outlines are used to help though the courses are not as yet thoroughly organized.

Denver.—A "Course of Study Monograph, Number Twenty-one, Science for Elementary Schools, Grades One, Two, Three, Four, Five and Six" outlines the program in these grades. This monograph was printed in 1927. The grades are grouped in two units of three each and the outline is organized similarly in many respects to that followed in Sacramento, California,—so much so that it would seem evident that the Denver outline must have influenced the later issued Sacramento program just as it has no doubt influenced others. There are some excellent type studies that remind one of the philosophy of Jackman, the father of nature study at Chicago University. Comstock's Handbook is referred to generously throughout the outline so that it seems evident that the committee preparing this outline made a rather adequate survey of existing publications on the subject. The outline stands critical examination much better than do many other more generally known and adopted outlines. Unlike the Pittsburgh, Pennsylvania, program there is little specialization in given sciences in particular grades and unlike the Los Angeles system there is considerable freedom of selection of material and considerable help on matters of grade placement. The outline for the early grades prints a total of 135 pages. The standard treatment for the topics includes reference to aims, to activities and experiences, to desirable outcomes, to teaching suggestions and information and to references. The aims are usually general rather than of a specific nature, consideration of specific species being generally cared for under the heading of teaching suggestions. The content includes biological and physical science subjects equally well. The course suggests seventy-five minutes per week for elementary science of which nature study is a part. Special trips are made to the Colorado Museum of Natural History by children in grades four, five and six. In the platoon schools some equipment, such as the aquarium and bird cage, is supplied to provide a place for certain animal life; and some equipment for the germination of seeds is provided. A definite schedule for field trips is in operation to the State Museum of Natural History which offers splendid opportunities for cooperation with the school system in the study of nature. The Colorado Mountain Club has among its members a number of Denver teachers and has branches in neighboring towns. The club is very active and has as chairman of the Nature Protection Committee, L. R. Kendrick of 2200 Bellaire Street. The club owns more than a thousand lantern slides covering many fields of nature. These are available for use by schools and other organizations.

Fort Morgan.—Beulah James of the Central School and Cleo Becker of the Lincoln School assume most of responsibility for nature and science work in the elementary schools of the city. Iris Good and Lawrence Burger and Fenar Cunningham have charge at the high school levels. The weekly time allotments for the work follow: First and second, twenty minutes each; third, thirty minutes; fourth, fifth and sixth, forty minutes each. Correlation with geography is most common.

Grand Junction.—The time allotment in minutes per week is as follows: First, second and third grades, forty-one minutes each; fourth, sixty-two; fifth, forty-four; sixth, fifty; seventh, sixty-five; eighth, ninety. There are no seasonal divisions in the work as outlined. The predominating idea for the various grades follows: First, needs of plants; second, dependence of animal life upon plants; third, adaptation of life to environment; fourth, biological significance; fifth, civic and economic biology; sixth, scientific method of study. The work aims to emphasize knowledge of nature as suggested above, ability to find scientific truth for one's self, love of nature and a spirit of open mindedness. Mimeographed sheets are provided for use in the first six grades. The eighth grade work is essentially general science. C. H. Buttolph is a leading nature teacher of the city. In 1929-30, a non-technical course in animal life was offered for the backward high school pupils who could not pass biology, physics or chemistry. It has already demonstrated that it is filling a good purpose.

Rocky Ford.—Mrs. A. J. McFarland is in charge of the science work at the elementary school levels. The required time allotments for nature and science in these grades follow: Fifteen minutes, each per week in the first, second and third grades and double this amount in each of the next three. In each of the six grades, a maximum of sixty minutes per week is allowed by the administration. A type outline is used to help teachers carry out the program suggested. Free correlation with geography is the practice. Field, garden and indoor laboratory work are possible to all of the pupils in the lower grades. It has been found difficult to secure teachers with the necessary knowledge of materials and methods to adequately handle these subjects at these grade levels.

Salida.—Miss Nellie Buck is responsible for nature and science work in the lower grades and L. A. Barrett for the work in high school. There is no correlation with other subjects and it has been found difficult to secure outlines suitable to the needs of the community.

Walsenburg.—Science and nature work in the lower grades is supervised through the superintendent's office. Theodore Lenz is in charge of it at high school levels. The time allotments required per week follow: First and second, seventy-five minutes each; third, fourth and fifth, one hundred minutes each; sixth, one hundred and twenty, and seventh and eighth, one hundred and thirty-five each. Definite correlation with English and hygiene is suggested and urged. The dryness of the climate makes outdoor biological studies difficult.

CONNECTICUT

Nature and science work has been recognized as a school activity in grades one to six in Connecticut since 1875. The work has been fostered largely by the state Audubon society and by the state public library committee. At present, Russell F. Lund, assistant for nature study, is responsible for statewide supervision. The supervision given consists largely of actual school visitation, help through teachers' meetings, recommendation of teachers' guides and helps, the preparation of guides and correspondence. At present, the state requires that rural, kindergarten, primary and grammar school teachers have at least seventy-two hours of preparation in the field of science. The state during the year 1929-30 provided material assistance by sending to each of about five thousand individual teachers about one hundred and forty pages of printed matter. Mimeographed sheets some two hundred and fifty in number were sent to two thousand and five hundred individual teachers and six hundred lantern slides were used at times during the year by one hundred and twenty-five teachers of the state. In addition, nature charts, boxed travelling libraries and a 16 mm. moving picture projector were available to the state's public schools. It is not compulsory that nature work or science be taught in the lower grades of the public schools but it is so recommended by the State Department of Education. The State's provisions call for some laboratory work indoors up to the sixth grade. Similar requirements exist so far as field work in science is concerned.

The State Board of Education published in 1925, "A Course in Nature Study, A Manual of Suggestions." This states as the aims of the state program, these units; to know and enjoy nature; to know how man is helped and harmed by nature; to conserve wild life; to form the habit of looking for cause and effect and to sense the wonders of creation. To assist in attaining these aims, seasonal suggestions are made in the following fields of science: " wild flowers," " weeds," " shrubs," " trees," " seedless plants," " animals," " birds," " insects," " weather," " earth " and " water life." Suggested units for study are the brook, the swamp, the life under stones, the roadside and the pasture. The spirit of investigation is encouraged by raising a large number of questions which may be answered by reference to the original sources of information in nature itself.

The Nature Guiding Plan in use in Connecticut parks and forests aims to help adults along nature lines. A certificate of accomplishment is given in each of the five major fields: " plant life," " animal life," " water life," " seedless plants " and the " earth and sky." The State Board of Education awards insignia to individuals completing work in any four of the groups. Typical requirements for one of these groups follow. Plant life—1. Identify and give the economic importance of twenty trees. 2. Identify and give the landscape uses of twenty shrubs. 3. Identify twenty wild flowers and twenty cultivated flowers and tell how each is propagated.

In addition to these contributions, the State Department of Education made in 1929-30 some interesting studies relative to the preparations and opportunities for improvement of representative high school science teachers. This gives valuable information for prospective teachers since it shows well what beginning science may be expected to do.

The State Agricultural College at Storrs has issued some excellent bulletins helpful in nature education. Probably the most valuable is " New England Trees in Winter " by Blakeslee and Jarvis.

Improvement in the training of teachers to handle nature and science work in the elementary schools seems to be characteristic of Connecticut at present. At the New Britain State Normal Training School, Charles E. Pratt is in charge of nature education. Each year he has about one hundred and sixty-five students through the year for two periods a week. The course as taught involves both method and content. The school is newly built and well equipped with a campus and surrounding country of such a nature that field trips may be made with profit. At the Danbury State Normal School, Beulah Conover is in charge of nature work. She teaches the classes in the normal school and supervises the science in the practice school. This arrangement permits a more prolonged and satisfactory contact with the students and allows the teacher to check up on the type of service being rendered.

Reports from Connecticut communities follow:

Ansonia.—Nature and science work in the lower grades is incidental. At the high school levels, the usual science offerings are made.

East Hartford.—No elementary science supervisor is available but Wayne E. Geer has charge of the work at the high school levels. In the elementary schools, the work is freely correlated with other subjects and the Trafton outline is used as a general guide.

Hartford.—An outstanding school in nature work in Hartford is the Elmwood School. Here nature work provides the stimulus for the activities in reading, spelling, language and other fields. Real objects are used for study almost invariably and experience to enrich vocabulary and knowledge is the key-note. The school is similar in many respects to Doan School in Cleveland and to many of the schools of Minneapolis.

Guilford.—H. P. Crosby is in general charge of the science and nature work throughout the public school system. Schools with third, fourth and fifth grades may elect to spend seventy-five minutes a week on nature and science studies but are required to spend no time on them. The same holds for the sixth, seventh and eighth grades where one hundred minutes may be elected. In the ninth, however, two hundred and twenty-five minutes are required. Printed material is used as a guide to the program followed. Correlation with the social studies is a common practice.

Thompsonville.—A situation somewhat similar to the above is to be found in Thompsonville. No time is required but thirty minutes may be elected each week in each of the first six grades, and sixty minutes in the seventh and in the eighth.

Watertown.—No elementary school science or nature supervisor is employed. Alfred Deland is in charge of the work at high school levels. Thirty minutes a week is required in science in each of the first eight grades. Correlation is common and is urged. It is most frequent with geography, hygiene and art. It is reported as being difficult to obtain adequately trained teachers to handle the science work at elementary grade levels.

West Hartford.—Twenty minutes a week is required in science or nature work in each of the first three grades and thirty minutes a week in each of the next three. A printed outline is followed and there is correlation with geography and language.

DELAWARE

The State Department of Education of Delaware has recognized nature or science work as a school activity above the eighth grade and below college grade since 1918. It also recognizes it as a school activity of the first five grades of the elementary schools.

The assistant state superintendent who is in charge of statewide supervision at the high school levels does so by actual school visitation, the supervision of teachers' guides and helps, the supervision of examinations and advancement standards and by the selection and adoption of text-books. The time required in science for those seeking the various teachers' certificates follows: rural teachers, kindergarten, primary and grammar school teachers, four hours each; senior high school teachers, six hours. Some mimeographed material is prepared for use by the science teachers of the state. The state requires the teaching of geography and hygiene in every one of the first six years of school. From the ninth to twelfth years, general science, biology, physics and chemistry are elective. The time allotments call for the following weekly expenditures: fifty minutes a week in each of the first five grades on nature study; fifty minutes in the first and second on hygiene; seventy-five in the third and the fourth and a hundred each in the fifth to eighth inclusive. Geography requires seventy-five minutes in the third, one hundred in the fourth, one hundred and twenty-five in the fifth and the sixth and one hundred and fifty in the seventh and the eighth. General science requires one year's work of five, forty-five minute periods a week. The high school sciences require two hundred and seventy minutes a week. The outline is mandatory upon the rural schools only.

No returns are available from the teacher training institutions of Delaware. The local returns are from Wilmington only. They follow:

Wilmington.—Violet Findlay is the nature supervisor of the first six grades. Mr. Snyder is responsible for the high school science. The weekly time allotments call for thirty minutes each in the first six grades. There is a mimeographed outline in which frequent correlation is made with health studies. Opportunity for all the grade children to work in gardens or out of doors is provided and about a fifth of the elementary school children have the opportunity of working in indoor laboratories. Miss Findlay's program has done much to develop small museum units for exchange of materials between schools. In this work she has had the cooperation of the city's Society of Natural History and of a number of nature minded clubs.

DISTRICT OF COLUMBIA

Science or nature work has been recognized as a school activity in the elementary and secondary schools of the District of Columbia since 1882. Since that time, the Smithsonian Institution, the Public Library of the District of Columbia and the Board of Education have done much to support the work. Supervision and help is provided through the following staff: schools for white children, Dr. William A. Hedrick, physics and general science; W. P. Hay, biology and chemistry; Esther Scott, science and school gardening in the elementary schools; schools for colored children, N. E. Weatherless, science in junior and senior high schools; P. J. Rayford, science and school gardens at elementary school levels. Supervision is provided by actual school visitation, attendance at teachers' meetings, supervision of teachers' guides, research activities concerned with effectiveness of supervision, supervision of examinations and advancement standards, supervision of selection and adoption of text books and correspondence. The time allotments per week call for sixty minutes each in the first and second grades; seventy-five each in the third and fourth; forty minutes each in the fifth and sixth; one hundred and thirty-five minutes each in the seventh, eighth and ninth and two hundred and forty minutes each for the tenth, eleventh and twelfth. The amount of time required for elementary science in the primary grades is necessary according to the administration because natural science is one of the important approaches to instruction and upon it and the social sciences other instruction is based. In the senior high schools biology, chemistry and physics are elective but some one science is required. The outline in the Fourth Yearbook of the Department of Superintendence of the National Education Association issued in February, 1926, was developed in connection with the public schools of the District of Columbia. It should be read by all interested in elementary school science programs particularly because of its splendid summary and arrangement of aims. The 167 page outline in printed form is in the hands of eleven hundred and four individuals in the District interested in nature education. In addition 108 pages of mimeographed material has reached four hundred and ninety-four nature education leaders and twenty-five hundred lantern slides are also available. Four 16 mm. movie reels are available for use in the schools. Science teachers in the District, if teaching below the seventh grade, must be normal school graduates. Those teaching above the seventh grade must have an A. B. or B. S. degree or a normal graduation and five years of successful teaching experience. They must also have had two courses in the subject which they are teaching. The teachers of the senior high school must be holders of the degrees mentioned and must have had at least two courses in the methods of teaching. Mrs. Elizabeth K. Peeples has done much to bring the work in science in the elementary schools to the present high level and deserves much credit for her contribution. Her place is being filled most satisfactorily by Esther Scott. The texts or supplementary readers used in the first four grades are those of the Persing Peeples series. In the fifth grade, Wood and Carpenter, Trafton, and Tower and Lunt books are most frequently used. In all of the work, correlations are suggested with oral and written expression, reading, drawing, painting, paper-cutting, toy making, songs, stories, poems, dramatization, puzzles, games, charts, scrapbooks, notebooks and collections. The program at the elementary school levels provides well for recurrent experiences in succeeding years rather than segregating content and presenting it unassociated in the different years. It is urged that provision be made for activities calling upon mental and physical processes, being certain that comparison, discrimination, inference and elementary summarizations assume increasing importance as the child progresses in the school work.

Nature work has had an important place in the training of Washington's teachers. Mrs. Susan Sipe Alburtis (retired in March, 1929) was a member of the faculty of the Wilson Normal School. She continues an inspiration to her many students. In the Myrtilla Miner Normal School more hours are required in science preparation than in the other elementary school subjects and all of the school's graduates apparently find themselves called upon to teach science.

Taking everything into consideration it would seem that the nation's capital has set a mark in nature education towards which most of the other communities of the country might well direct their course. The work has been long recognized. Teacher training work has been well cared for and developments have been studied for improvement by adequately trained supervisors. The result is satisfactory as would be the case in other communities where similar support was given.

FLORIDA

Science work has been a recognized school activity by the Florida State Department of Education since about 1900. In that year, it adopted the standard high school curricula. Five years later work in nature and science was recognized by the department as a part of the curricula of the first eight grades. The institutions in the state which have done much to encourage the work are the State University and the Florida State College for Women. Supervision of this work in the public schools is cared for by three general supervisors who work in the high schools and elementary schools. Supervision consists of school visitation, the preparation of teachers' guides, research activities concerned with the effectiveness of supervision, the reviewing of teachers' credentials, supervision of public examinations and advancement and supervision identified with text book selection and adoption. In addition to the printed course of study prepared by the state department of education there is some valuable material issued by the state departments of fish and game and of forestry. The state ruling relative to nature or science work in the elementary schools requires the teaching of geography, agriculture, physiology and hygiene in the first six grades and permits communities to require the teaching of nature study. At the high school levels some one unit of science is required and three other units may be elected. Two interesting laws having a bearing on nature education in Florida are here quoted.

" Sec. 248. Time to be Devoted to Humane Education.—In every public school within this State not less than one-half hour each week during the whole of each term of school shall be devoted to teaching the pupils thereof kindness and justice to, and humane treatment and protection of, animals and birds and the important part they fulfil in the economy of nature. It shall be optional with the teacher whether it shall be a consecutive half-hour or divided into shorter periods through the week, or whether such teaching shall be through humane reading, stories, narratives of daily incidents, or illustrations taken from personal experiences. The instruction shall be a part of the curriculum of study in all the public schools of the State."

" Reg. 12. Arbor Day.—The State Board of Education names the second Friday after the first Monday of January of each year as Arbor Day, which shall not be observed as a holiday, but shall be devoted to the planting of trees on school grounds or other appropriate public places, together with suitable exercises, lessons or lectures designed to interest and instruct the children in the care and cultivation of trees. No teacher should be allowed compensation for Arbor Day, unless a prescribed number of trees has been properly planted and securely protected against injury."

GEORGIA

In the Georgia 1927 State Outline for Teachers, nature work appears only as home geography in the third grade. At the South Georgia State Teachers College, formerly the Georgia Normal School, a center of leadership in nature education has been developed by Malvina Trussell, head of the science department, with the cooperation of Effie Bagwell of the practice school. The school graduates about fifty students a year who will enter elementary school service. Those receiving the normal diploma are required to pass a course in general nature study and may take an additional course in the teaching of science in the grades or in the high school. The preparation the graduates receive to teach nature study or science is in general about equal to that received for the teaching of other school subjects apparently.

In the Atlanta Normal Training School, both nature study and gardening are taught both to teachers in training and to the children in the practice school. Nature study is taught in the practice school from the first grade up. The time given teachers in training is divided between help in method and in content.

At the Georgia State College for Women, Mabel T. Rogers has played an important part in training prospective teachers in the physical sciences. About three hundred are graduated from this school each year and a majority of these will teach in the elementary grades. These graduates must have taken courses in biology and chemistry. They may have elected a two-hour course in methods of geography or nature study. The work is being strengthened.

The State Board of Game and Fish of Georgia has an organization for Georgia boys and girls known as the Loyal Legion of Nature Guardians. Among other things, members pledge themselves to take at least one early morning hike in September, October and November and learn the names and food habits of birds and mammals to be found in each month. For the three winter months, a hike a month is required with the studies centering around permanent and winter residents and particularly the hawks, owls, foxes, deer and moles of Georgia. For the months of March, April and May, a hike a month is required with observations centering around the nests and dens of creatures to be found. The hikes required for the months of June, July and August center around observations on the food habits and protection of young animals and studies of snakes and forest fires. For each of these seasonal units, appropriate emblems have been chosen. The State Board provides an attractive outline to guide the observations made in the fields and provides a Constitution and By-laws for the study groups.

In the Georgia communities, we find work well developed in a few. A brief consideration of some of them follows:

Albany.—A printed outline is followed under the supervision of the superintendent in the lower grades and of the high school principal in the upper grades. Fifty minutes a week is required in both the second and third grades.

Atlanta.—Hattie Rainwater is the supervisor of nature study for the elementary grades. Science work also has a department head for the high school levels. The time requirements per week follow. The work in the first three grades is freely correlated with other activities. Sixty minutes is required in the fourth grade, ninety in both the fifth and sixth and two hundred and forty in each of the seventh, eighth and ninth grades. A printed outline with mimeographed additions is followed. Field and garden work is given in kindergarten and the first six grades in about half the schools of the city and indoor laboratory work is possible in all of the seventh to ninth grades inclusive.

Fitzgerald.—Sixty minutes a week is allowed for nature or science work in each of the first seven grades but none is required. Three hundred and fifteen minutes a week are required in both the eighth and the ninth grades. Gardens and indoor laboratories are available in about one-fourth of the schools.

HAWAII

The Territorial Normal School is the center of school nature education of Hawaii. There Rebecca Banks is in charge of the two courses particularly concerned with this work. These courses are largely content courses and since the materials available for study are so different from those treated in the standard books used on the mainland it is natural that the content is different. Mimeographed outlines to help the prospective teachers have been used for some time with success. These recognize the major groups treated in other outlines. According to Miss Banks' report it would seem that most of the materials studied are seen first hand in the open. The fact that information is not available in books may have helped considerably in bringing about this desirable condition. The themes studied concern themselves largely with ecological relationships, life histories, physiological relationships, food values, distribution, beauty and seasonal studies. Little equipment is available for carrying on indoor studies and probably is not considered necessary since about ninety-five per cent of the studies are with living things in their natural setting.

A training school is maintained in connection with the normal school where the teacher of methods in nature education has the opportunity to observe the practice teaching of the students she has trained. Besides the courses offered in the normal and training schools extension courses are available to teachers in service. This is generally in the form of late afternoon classes for the teachers of the city of Honolulu.

There is a marine biological station at Honolulu. Its activities are essentially those of research. C. H. Edmonson is the director.

IDAHO

Science work has been recognized as a school activity at the high school levels by the State Department of Education since 1919. It has been recognized as an activity for the lower grades since 1915. The institutions in the state which have done most to assist in making the science and nature work effective are the normals at Albion and Lewiston, the University of Idaho and the Southern Branch of the University of Idaho. The state has issued a high school manual and a course of study for the elementary schools which outlines the approved program for the state. Supervision of the program is provided by four state rural supervisors. This supervision consists of actual visitation of schools, taking part in teachers' meetings and research activities concerned with the effectiveness of their own activities. Rural and primary teachers are required to have had at least eight hours of course work suitable to preparing them to teach science. Kindergarteners are required to have seven hours, grammar school teachers, five hours and high school teachers, ten hours. Mimeographed supplementary material totalling about fifty pages was sent during the last year to approximately two thousand individuals in the state. The present state requirement provides a time allotment of two twenty-five minute periods a week in nature or science in the second and in the third grades; one such period in each of the fourth, fifth and sixth grades and two thirty-minute periods a week in the seventh and eighth grades. The requirements above the eighth grade vary but set a minimum of work in at least two sciences for graduation. A new state outline is in course of preparation. The old outline is probably accessible to all of the teachers of the state at present. The state requirements apply both to city and to rural schools. There are no state adopted texts.

At the Lewiston State Normal School, Roy E. Rodock is in charge of the nature education work. About seventy-five per cent of the graduates or one hundred and fifty a year enter the elementary school field and will probably be called upon to teach nature study. Apparently the teacher in charge of the work has a heavy teaching schedule but in spite of this emphasizes the study of real materials in the natural setting wherever such a thing is possible. In general, the themes of the studies center around forestry, agriculture or industry and emphasize economic relationships as well as matters of an essentially academic nature.

The returns from Idaho communities follow:

Nampa.—The weekly time allotments in nature and science work follow: First and second grades, fifteen minutes each; third, four and fifth, twenty minutes, each; sixth, twenty-five, and seventh, eighth and ninth, fifty-five minutes, each. Mimeographed outlines are available to help towards successful work in nature and science though libraries are not so easily accessible as would be desirable.

Sandpoint.—The weekly required time allotments follow: Fifth grade, one hundred minutes; sixth, one hundred and fifty; seventh and eighth, two hundred, each, and ninth, two hundred and twenty-five. No work is required in science or nature work below the fifth grade but fifty minutes a week may be spent in the first, seventy-five each in the second and third and one hundred in the fifth. Correlation with reading, geography, hygiene and language is common and field work and indoor laboratory work is cared for in the ninth to twelfth grades. The work in the lower grades at present lacks considerable organization.

St. Anthony.—A printed outline is followed and definite correlation is urged with language, reading and geography. Because of difficulties of time and space there is little work done in the field or in indoor laboratories apparently.

ILLINOIS

The State Department of Education of Illinois has recognized nature or science work as a school activity above the eighth grade since 1872 and as an activity from the first to seventh grades since 1898. The University of Chicago and the five state normal schools have exerted the greatest influence on the development of this type of education in the state. At present, there is no state official charged primarily with the supervision of science teaching in the state. Requirement relative to the teaching of science in the different communities is under the direction of the local school boards.

Nature study, as outlined in the " Illinois State Course of Study " by Alice Jean Patterson, offers splendid opportunity for the proper development of the work in the city and in the rural districts. The outline is published by the Parker Publishing Company of Taylorsville, Illinois. The program, as outlined, is closely identified with health education and, in the upper grades particularly, is at times devoted primarily to health aspects. The work is so planned that there is opportunity for intergrade work and grade grouping, which permits the expenditure of longer periods of time upon given topics than would be the case otherwise. A definite alternating program for odd and even years such as appears in the School Nature Outline in this book, is followed. No particular science is emphasized any particular year and it is possible, though rather difficult, for a teacher to follow the outline and teach all grades at once around a common topic. Such a practice is of course almost necessary in certain rural school situations. In a bulletin, " In One-teacher Schools," issued by the State Superintendent of Public Instruction for the benefit of rural teachers, provision is made for the handling of all of the first four grades at one time if necessary, allowing fifteen minutes a day for this work. This bulletin, published in 1926, together with the state course of study will offer most helpful suggestions to any concerned with the preparation of a state outline. There are few that seem more practical than that of Illinois. An interesting series of books on health education and nature study listed on page 348 was published by McKnight and McKnight of Normal, Illinois, just after Miss Patterson's unfortunate death. They probably represent her best judgment on the subjects in which she was most interested.

Nature work in the schools of Illinois probably dates back to 1889, when Wilbur Jackman, later called appropriately the " Father of Nature Study," came from Pittsburgh to the Cook County Normal to take charge of instruction in science. Jackman attempted to adapt science as it was recognized to the child rather than to adapt the child to science. He felt that the child's nature experience was measured by breadth rather than depth of experience, and he therefore discouraged detailed study of type specimens and encouraged broad experiences with many things generally chosen with a seasonal significance. Later, Jackman became Dean of the School of Education of the University of Chicago with complete charge of the elementary school where he developed a strong nature study department. Since Jackman's death, the work at Chicago has continued to grow under the direction of Otis W. Caldwell, now of Columbia, and later under the direction of Elliot R. Downing. While Dr. Downing is in general charge of the work, he does not now teach the classes in nature study himself. At present, Ada R. Polkinghorne, teacher of the first grade of the University Elementary School, teaches a methods course in nature study or elementary science to university students in addition to her regular class work. O. D. Frank conducts an extension class in science methods on Saturdays for grade teachers in Chicago and vicinity. In addition, he teaches a similar course during the summer session. The emphasis in all these courses is placed on method of teaching. A supervisor of science, Paul Edwards, has been recently appointed for work in the Chicago public school system. He has a background of successful experience as a high school science teacher. A temporary course of study for the grades has recently been drawn up. In the Chicago Normal College, Dr. Sherz has charge of the biology department and teaches a botany course that is adaptable to elementary grade teaching. Grant Smith in the same institution teaches the zoology from the point of view of the grade teacher. Special emphasis is placed on indoor units of work. Mr. Smith gives radio talks regularly on the subject of nature study teaching. He supplies his listeners with outlines and suggestions before the talk is given so that the work may be more effective.

At the Eastern Illinois State Teachers College at Charleston it would seem that no great amount of emphasis is placed on preparing teachers for teaching science in the elementary school. Instead the students take courses in more specialized fields, such as botany or zoology. A course designed to help at the elementary grade level is to be formulated but has not yet been perfected.

The Illinois State Normal College at Normal, Illinois, offers nature work and gardening in all of the grades. In the lower grades, it is made the basis of reading and language, one hour and twenty minutes a week being allowed for the work. In the four upper grades, two forty-five minute periods a week are given in nature work. While work at this institution was developed largely by the late Alice Jean Patterson, it is now the responsibility of John E. Fraley and Neva McDavitt.

Science training at the Northern Illinois State Teachers College at DeKalb is under the leadership of C. E. Montgomery. The excellent facilities offered at the institution for successful field work are recognized and used to advantage.

Illinois issues regularly a superior type of Arbor Day bulletin which contains considerable helpful material for use in nature education.

The activities of the Illinois cities follow:

Charleston.—Nature work in Charleston is correlated largely with agriculture and general science. There is no special supervisor in charge of the work.

Chicago.—As indicated above, Paul G. Edwards has recently been made science supervisor for the grades and through the high school. A tentative schedule for science and nature in the grades has been worked out which calls for the following weekly time allotments: First, second, third and sixth, seventy-five minutes, each; fourth, one hundred minutes; fifth, one hundred twenty-five; seventh and eighth, one hundred fifteen, each, and ninth, one hundred fifteen to two hundred twenty-five. Provision is made for indoor laboratory work in grades seven to twelve in all of the schools and for greenhouse or conservatory work in all of the tenth grades. There seems to be some difficulty in securing satisfactorily trained science teachers in Chicago.

Chicago Heights.—Nature or science teaching here is the responsibility of the superintendent and building principals. One hundred minutes a week is required in each of the seventh and eighth grades. In these grades provision is made for indoor laboratory in all of the schools. Since September, 1929, all seventh and eighth grade pupils have been cared for in an intermediate school building which contains a general science laboratory and a "growing room." One teacher gives full time and another half time to the science work. There are two fifty minute periods per week. Work in the first to sixth grades is combined with reading, handwork and geography. Considerable field work is done in third grade geography which might be classified as nature work.

Downers Grove.—Nature work is given in a general way by the teachers under the direction of the principal. Active leaders in the work are principals, Nellie Dunbar, Dorothy Buffum, G. H. Brown and Mrs. Maude Whiffen. An active nature club assists where needed. Most frequent correlation is with geography.

Galva.—Nature work is carried on without special supervision. The superintendent, F. U. White is responsible for science at all grade levels. The weekly time allotments are as follows: Sixty minutes in each of the first eight grades and three hundred and fifteen in the ninth. Work in the second and third and in the fourth and fifth is grouped. Provision is made for using gardens and indoor laboratories where needed. The science teachers are well prepared to do their work according to the superintendent.

Geneseo.—Each teacher in the first six grades is responsible for the nature or science there taught though supervision is provided by Superintendent J. D. Darvall and Miss Baker and Mr. McHorney, principals. Marion Hand, visual aids supervisor is responsible for the science at high school levels. The work is frequently correlated with language.

Glencoe.—Clara M. Dietz is responsible for the nature work taught in the first six grades. The weekly time allotments for the grades are as follows: First, second and third, forty-five minutes, each; fourth and fifth, sixty, each; sixth to eighth, ninety minutes, each. Provision is made for indoor laboratory work in all of the sixth to eighth grades inclusive. Mimeographed outlines are used as guides.

Harrisburg.—Superintendent R. Pulliam is responsible for the science taught in the schools here. Weekly time allotments are as follows: First to fifth, forty minutes, each; sixth, eighty minutes. Indoor laboratory work is provided for grades one to six and the work is correlated frequently with language and art. Printed and mimeographed outlines are used to assist in teaching in this field. Miss Patterson's "Nature Study and Health Education" is available for use in each grade of the system and the outline is followed rather closely. An examination of some of the mimeographed matter indicates a strong tendency to emphasize working with living things and actual manipulation of inorganic things. The aims of the work in nature study are stated as being, "(1) to enrich the child's experiences with things in the world outside the school, (2) to increase his general knowledge, (3) to engender habits of observation and attention to the world, and (4) to lead him to appreciate nature, and to be interested in how things grow and work." One of the main difficulties of making the program most satisfactory seems to lie in the difficulties of getting the teachers to see what is back of nature and science education.

Highland Park, District 107.—Superintendent Jesse L. Smith is responsible for the science work in the elementary grades, and Bert S. Leech for it at the high school levels. The weekly time allotments for the grades follow: First, sixty minutes; second and third, ninety, each; fourth, one hundred and twenty minutes, and fifth to eighth, one hundred and fifty, each. Mimeographed outlines are used to help in the work. Correlation with geography is common in the third and fourth grades. Greenhouses are available for work in the first six grades and indoor laboratories in grades five to eight inclusive. Opportunity for work in gardens and fields is provided in each of the first six grades.

Highland Park, District 108.—The room teachers are responsible for the nature and science work in the first four grades. Mrs. Clara Walton, of Lincoln School, cares for it in grades five to seven of that school and grades five to eight of Ravinia School are cared for by Mrs. Elizabeth Nesselrod. Time allotments in nature and science permitted by the school system follow: Second and third grades, ninety minutes, each, per week; fourth, one hundred fifty; fifth and sixth, one hundred thirty-five, each; seventh, one hundred twenty and eighth, ninety minutes. There is no definite correlation with the other subjects taught.

Joliet.—A general subjects supervisor is responsible for the science taught in Joliet public schools. Weekly time allotments are as follows: First and second, twenty minutes, each; third, twenty-five; fourth and fifth, forty, and seventh, one hundred and thirty-five. Work in the sixth grade is correlated with other subjects. Opportunity to do work in fields, gardens and indoor laboratories is provided in all schools.

La Grange.—The nature or science teachers in the first six grades are Nell Hashogen, Bell Prater, Dorothy Chapman and Leota Thomas. The time allotments permitted for the grades each week are as follows: Second to fourth, ninety minutes, each; fifth to eighth, one hundred twenty, each. Provision is made for indoor laboratory work in all sixth, seventh and eighth grades, but field work seems practically impossible to arrange for.

Morris.—The school principals are responsible for the nature and science work in the elementary schools, and at the high school levels the authority rests upon R. F. Boyd, the principal, and A. R. Grisme. In the seventh and eighth grade, one hundred and eighty minutes in each are required. Other time allotments permit a weekly expenditure, per grade, as follows: First to third, fifty minutes, each; fourth to sixth, seventy-five mintues, each; eighth, two hundred and twenty minutes.

Mound City.—Elizabeth Crozier is nature and science supervisor of the fifth and sixth grades, and Sidney R. Frey at the high school levels. The weekly time allotment required for work in nature and science follows: Fourth grade, fifty-five minutes; fifth and sixth, two hundred, each; ninth, two hundred and twenty-five minutes. A printed text and some mimeographed materials are used as guides.

Princeton.—George C. Smith, superintendent of the elementary schools is responsible for the science and nature work at these levels, and O. V. Shaffer has the responsibility at the high school levels. The weekly time allotment for each grade follows: First to third, fifty minutes, each; fourth to sixth, sixty minutes, each, and seventh and eighth, three hundred minutes, each. A printed outline is followed and free correlation with reading is made. Field and garden work is optional and there is no indoor laboratory work provided for in the lower grades. There seems to be some difficulty in securing enough teachers adequately trained in science to make the program most effective.

Quincy.—Nature work is not required in the first five grades though seventy-five minutes per week is permitted in each. In the sixth, seventh and eighth grades sixty minutes each is required and in the ninth grade two hundred and twenty-five are required. There is no correlation with other school subjects though it is stated that the pressure of other subjects interferes most with adequate work in science. Provision is made for indoor laboratory work in all grades from the eighth to the twelfth inclusive. Principal W. E. Nelson is in charge of the science work at these high school levels.

Rock Island.—A general supervisor cares for the nature and science work of the kindergarten and first three grades, another cares for grades four, five and six and another for grades seven to nine. In grades four to six, the work is elementary general science. General science follows for the seventh to ninth grades and biology, physics and chemistry in the upper levels.

Savanna.—Superintendent Ivan I. Meyer is in charge of the science work in the elementary schools. The Baltimore County outline is followed and there is some correlation with spelling and writing. Provision is made for indoor laboratory work in the sixth, seventh and eighth grades. There seems to be some question as to what type of materials is most suitable for the different grades as is the case in many other schools.

Spring Valley.—The Superintendent and the principals are responsible for nature and science at elementary school levels. C. X. Carver assumes the responsibility at the high school levels. The time required weekly follows: First grade to and including the sixth grade, twenty minutes, each; sixth and seventh grades, thirty minutes, each.

Streator.—Superintendent H. B. Fisher is in charge of the science of the elementary schools and W. D. Waldup of the high school grades. Thirty minutes of work is required in each of the first three grades and double that time allowed. There is no correlation with other subjects.

Sycamore.—The printed state outline is followed in the schools of Sycamore. R. A. Lease is the general supervisor of the work in nature and science. One hundred minutes per week is required in each of the first four grades, two hundred in each of the fifth to eighth grades, and three hundred in the ninth grade. Frequent correlation is made with geography, hygiene and civics. Provision is made for garden and field work in all grades and for indoor laboratory work in the fifth to ninth grades.

Wilmette.—Nelle E. Moore is the supervisor of the elementary school work in nature and science; Miss M. Brown of the work in the fifth and sixth, and Miss D. Stevens of the work in the seventh and eighth grades. Thirty minutes of work is required each week in the fifth and sixth grades and forty minutes a week each in the seventh and eighth. The Columbia University and the National Education Association outlines are used. Correlation activities are mostly confined to the first grade.

INDIANA

We have no evidence that there is a state science outline for use in the elementary schools of Indiana. One is to be prepared in the near future, however. At present, the requirement to teach science begins with the seventh grade. In the seventh and eighth years, a science program calling for work four days a week for two semesters is scheduled.

Nature study appears in the work fostered by the teacher-training centers of Indiana. At the Teachers College of Indianapolis which has recently become affiliated with Butler University, Elizabeth Downhour is in charge of the work in nature study. Field trips are commonly used as a method of teaching. At Ball State Teachers College at Muncie, the advanced biology and nature study classes are taught by the same teachers, O. B. Cristy and Mr. Crookes. This situation has seemed to be effective in humanizing the advanced biology and making sane the nature study. The equipment at Ball is adequate for the needs of the students when compared with that of other institutions. One course is required of all students preparing to become elementary school teachers and an additional elective course in the methods of nature study is offered. Two courses in nature study are required of students taking four years preparatory work for elementary school service. A great amount of the work offered in the courses is associated with field activities. At the Indiana State Normal School at Terre Haute, only one or two teachers of a rather large science staff seem to be concerned with teaching science or nature study to prospective elementary school teachers. There is, however, splendid cooperation between Geraldine Shontz, who supervizes the work in the training school, and W. H. Woodrow, who teaches the classes in the normal school. Emphasis at the institution in general seems to focus more towards the preparation of secondary school teachers and the professional courses offered in the universities. At Central Normal College at Danville, the science work consists of one year of botany alternating in the summer with a course in zoology. The following year the order is reversed. This course is taught by Miss Watts, who also teaches a class in literature. The setting of the school offers opportunities for splendid work in nature education.

The Nature Study Club of Indiana has done much to encourage nature work in the schools and to hold the interest of laymen. Some interesting books such as " The Trees of Indiana " and " The Shrubs of Indiana " have been published by the state and have proven generally valuable. Such books as Blatchley's " Coleoptera of Indiana " now unfortunately out of print have set standards in science literature for other states to follow. These books may be highly technical but they show that the state is making its contribution to nature and science education.

The communities showing prominence in their nature work are as follows:

East Chicago.—Nature work appears in each of the elementary grades. It is correlated with social science and reading in the first three grades and taught as a separate subject in the fourth and fifth grades.

Elwood.—Nature study is a regular part of the elementary school activities.

Garrett.—Nature readers are used in the elementary schools. Nature work is elective and not required and it is frequently correlated with reading and with geography.

Gary.—Nature study and elementary science is required for sixty minutes per day for five days per week for at least one-half of the school year in each of the grades. This makes an average of one hundred and fifty minutes per week for the whole school year. In the smaller schools engaging in fewer special activities, three hundred minutes per week for forty weeks is given. The most frequent correlation is with history, geography and drawing. The outline followed is prepared by the teaching group and by the director of science of the city school system. Provision is made for field, garden and laboratory work in all of the schools. Greenhouse and conservatory work is carried on in one grade. Elizabeth P. Ames is the nature supervisor.

Goshen.—Work is being done in the nature and science fields but no statement has been offered by the authorities as to whether this was required or elective. Provision is made for field, garden and laboratory work in all of the grades. Mrs. Myrtle Cable is responsible for the nature work in the city.

Indianapolis.—Rousseau McClellan of the Shortridge High School is a leader in nature activities. There is a strong nature club in the schools. The work is a part of the program in each of the eight grades and is correlated with English. The course is printed. It recognizes grade differences and seasonal problems.

Michigan City.—Fifty minutes per week are required for nature work for the first six grades. The most frequent correlation is with geography and with reading. Provision is made for field and garden work in the first six grades. A mimeographed outline is used by the teachers. The principal of each school is responsible for the nature work taught.

Newcastle.—An average of thirty minutes per week is required for nature work in the first nine grades. The most frequent correlation is with geography and with literature. No outline is followed. Mrs. Sam Bufkin encourages and fosters the nature work in the city.

Richmond.—Beginning with the first grade in which twenty minutes per week are required in nature work, we find an increasing amount of time devoted to nature work until the sixth grade is reached. Here one hundred minutes per week are required. The most frequent correlation is with English. Provision is made in the schedule for field, garden and laboratory work in the first six grades. The Horace Mann School Outline for Elementary Science is used by the teachers. Georgia Davis, assistant superintendent, is the officer responsible for the nature work.

Seymour.—Sixty minutes per week are required in the second, third and fourth grades. One hundred and forty minutes per week are required in the fifth and sixth grades. The most frequent correlation is with reading. Provision is made for indoor laboratory work in the elementary grades. No course of study is followed. H. R. Noe is the school officer responsible for nature work in Seymour.

IOWA

A new course of study for elementary schools in Iowa was issued in 1928 and a new one for the high school levels appeared in 1930. The former was prepared by a committee whose chairman was Dr. George Hendrickson of the State College of Agriculture and Mechanical Arts at Ames and the latter by a committee whose chairman was Lillian Heathershaw of Drake University, Des Moines. The colleges represented by these two individuals, the elementary school of the State University at Iowa City and the State Teachers College at Cedar Falls have played an important part in developing the accepted standards of the present.

The course of study for the elementary schools is an excellent outline for use in graded schools but would be difficult for adoption in its present form to a situation in a rural school where one teacher would have to handle eight grades at once. To be specific we may note that such a teacher using the outline in the fall in a study of animal life would have to have a " timber squirrel " for study in the first and second grades; a flicker, swallow or milkweed caterpillar for the third; some bird such as an English sparrow for the fourth grade; some birds but no mammals for the sixth; some ancient backboned animals for the seventh and some game bird for the eighth. Obviously it would be an administrative impossibility to expect a rural teacher to supply materials for study in all the grades on these subjects. The outline states at the beginning, however, that the topics are suggestive and suggests that it may be found advisable in the future to prepare a special outline for use in rural schools. There is no doubt but that the present outline will prove of great value in schools where the teacher has responsibility for but a single grade. Each grade's treatment involves consideration of aims, procedures, seasonal subject matter and teacher and pupil references. The subject matter involves the physical as well as the biological sciences. The references are general rather than specific. A useful introductory section provides suggestions for notebooks, posters, exhibits, general programs and the care of live specimens.

There are no specific supervisors of science working on a state-wide basis in Iowa. The work in science in the elementary schools has a " place on the program but is not absolutely compulsory." While a statement from the State Department of Education's office gives science or nature work a weekly time allotment in each of the first three grades of thirty-five minutes, and of twenty minutes in each of the next four, it seems obvious from an examination of the suggestive program for rural schools that this time must be shared with hygiene, moral education, history and citizenship. The suggested time allotment in the eighth grade is sixty minutes a week. In the ninth, two hundred and eighty are allotted to agriculture and two hundred to general science. Physics or chemistry in the senior high schools are allotted two hundred and eighty minutes a week each. Iowa does not have state adoption of text books.

Unofficial correspondence with leaders in nature education in the state would indicate that there is comparatively little work in this field being done in nature or science education in the rural schools and Iowa is essentially a rural state. In the other schools, it would appear that Trafton's " Nature Study and Science," the Horn "Learn to Study " readers and the Lincoln readers supply a great proportion of the supplementary reading. It is unofficially estimated that while none of the county superintendents appear to be opposed to nature education, only about one in four urges its inclusion with any considerable emphasis. It seems to be the general opinion that in spite of this there is an increasing recognition of the value of science and nature work in Iowa's elementary schools. The county superintendents at Cresco and Decorah have required that each rural teacher carry on some individual nature projects with their pupils. The exhibits from this work indicate that the quality and quantity are improving. All of this development apparently has the support of the State Department of Education and of Miss Agnes Samuelson, the state superintendent.

There are many centers of leadership training in the state. At Drake University under the leadership of Lillian Heathershaw, from two hundred to two hundred and fifty students receive some preparation in elementary science in a year. In addition, two classes of Des Moines teachers who are in service are cared for. Apparently the work is done using real materials for study as much as possible. The themes emphasized include conservation, recreation, ancestry, life history, ecology, seasonal studies and food values. As one might expect from the nature of Iowa, agriculture, industry and mining are introduced where suitable and little is done in forestry. At the Iowa State College, emphasis is not placed on preparing students for work in the elementary schools though probably a hundred graduates a year do go into that service in one capacity or another. Dr. George Hendrickson has been interested in this field of work at the state college. The work in the summer at the state college is much stronger than that during the regular year because of the attendance during the summer session of teachers who are in service during the regular school year. At the State University, the work centers around the activities of the elementary school where Bernice E. Stormes has played an influential part. Unfortunately we do not have adequate returns on the activities at the state university. At the State Teachers College at Cedar Falls, the work has been the responsibility of Miss Winifred Gilbert. Apparently, nature study is not required for any teacher preparing for elementary school work. It is elected if the student's advisor sees fit. Also in spite of the fact that college credit is given for nature study work at Columbia, Cornell University, Pennsylvania State College and elsewhere, it is not credited towards a degree at the Iowa State Teachers College. This of course interferes with programs. In spite of these purely administrative difficulties, the classes in nature study enroll in the neighborhood of two hundred a year. Upper grade and intermediate teachers are required to take five hours credit in earth science and geography and three hours in hygiene and sanitation. The institution publishes a monthly extension bulletin known as *Science*

Bulletin of which Dr. C. W. Lantz is the editor. This bulletin aims to help teachers of high school science and helps the special science teacher rather than the general public school teacher. It seems unfortunate that the state does not supply similar help in nature and science education to the general teacher working at the elementary school levels.

There are a number of special training courses carried on in the state aiming to help those who wish to work learning of nature in the fields. The American School of Wild Life Protection is discussed on page 140. At Fairport, there is a fisheries biological station operated for research only by the United States Bureau of Fisheries. At Milford, Iowa, in the lakes region of the state, is the Iowa Lakeside Laboratory of the State University of Iowa. The 1930 sessions were from June 16th to July 19th and from July 21st to August 23rd inclusive. At Bluff Park, Montrose, Iowa, is the Lake Cooper Biological Laboratory sponsored by the Iowa Wesleyan College. It held its 1930 session from June 16th to July 12th. In addition to these schools concerned for the most part with gaining knowledge of science, we find that the State University offered a special two-weeks course from June 16th to June 27th, 1930, designed as a Camp Counselors Training Course. Nature work was given a place on the program of this course.

Iowa's local communities have reported the following activities:

Burlington.—Kitty Tiedemann is the supervisor of nature and science work of the first eight grades.

Cherokee.—Superintendent N. D. McCombs is in charge of nature work in the elementary grades and R. E. Creel of the high school science. The weekly time allotments are as follows: Fifteen minutes each in the first three grades; twenty minutes each, in the fourth and fifth grades; thirty minutes each in the sixth, seventh and eighth, and sixty minutes in the ninth. Correlation with geography is common. There seems to be difficulty in securing teachers trained to handle the work in the elementary grades adequately.

Colfax.—Hazel Henry supervises the work in the first six grades. The city follows the state outline and offers the following time allotments: First and second grades, forty minutes each; third, fifty minutes; fourth and fifth, sixty minutes each; sixth, one hundred minutes; seventh, one hundred fifty; eighth, two hundred and ninth, three hundred minutes.

Des Moines.—Bessie Bacon Goodrich is in charge of nature work in the first six grades. Time allotments give the following schedule: Third, fourth, fifth and sixth, thirty-five minutes each. The work is frequently correlated with geography, and Dr. Craig's outline is used to some extent. It has been difficult, however, to secure a properly developed course of study suited to the immediate needs.

Emmetsburg.—Dan Glennon is supervisor of science at the high school levels. The work in the lower grades is freely correlated with language, reading and geography. No definite amount of time is alloted to the work.

Fairfield.—Superintendent W. G. Pence is responsible for the elementary school science and J. F. T. Saur for the high school science. Weekly time allotments call for the following: Fifty minutes each in the first three grades; seventy-five each in the next three; one hundred, in the seventh and fifty in the eighth. The work in the lower grades is freely correlated with reading and history.

Fort Madison.—Jennie Goff is supervisor of the work in the elementary grades. The time allotments for the city follow: Fifteen minutes a week in the first and the second; twenty each in the third and fourth; twenty-five each in the fifth and sixth; fifty, in the seventh; one hundred in the eighth and two hundred and fifty in the ninth. A mimeographed outline is followed in which correlation with geography is common. Field and indoor laboratory work is encouraged and possible in the upper grades.

Harlan.—Eunice Grove is in charge of the nature and science of the first six grades and Rollo S. Allred of the high school science. Weekly time allotments call for ten minutes in the first grade, fifteen minutes each in the third to sixth inclusive, and twenty-five each in the seventh and eighth. Definite correlation is made with geography and history. It seems to be difficult to secure interested teachers.

Indianola.—Superintendent W. H. Hoyman is in charge of the science work which follows the state outline. No time is required though an average of twenty minutes a week is permitted in each of the first six grades. Correlaion with reading and geography is common.

Knoxville.—A. J. Steffy is responsible for the work in the elementary grades and Mary Ellen Cathcart at the high school levels. The Fourth Yearbook of the National Education Association is followed in the grades and correlation with reading is commonly made.

LeMars.—Twenty minutes a week is required in nature or science in each of the first six grades and ninety minutes in the eighth. Correlation with reading is common and it is reported as being difficult to secure adequately trained teachers for work at the elementary school levels.

Mason City.—Correlation with geography is common in the grades. No time allotment is made except for sixty minutes a week in the eighth and sixty-five a week in the ninth. An outline is now being prepared for a more generous recognition.

Newton.—A rather ambitious nature program is followed.

Perry.—L. E. Easter is in charge of science at the high school levels. Eighty minutes a week is required in each of the first four grades; ninety, in the fifth and the sixth, and two hundred, in the seventh and the eighth. A printed outline is followed.

Tama.—E. H. Nelson is responsible for the science and nature work at the elementary school levels and Benjamin Jones, Jr., for the high school science. Twenty-five minutes a week is allotted for science work in each of the first four grades; twenty each, in the fifth, sixth and seventh;

twenty-five, in the eighth and forty-two in the ninth. None of these allotments is required except that of the ninth. A printed outline is followed in which correlation with reading is common.

KANSAS

The elementary curriculum in nature study prepared by L. D. Wooster for publication in 1926 is in force in Kansas and is followed by the rural and elementary schools to some extent. This is a rather brief outline printing less than four pages with three or four other pages on general points. According to the program " there are two outlines of nature study: (1) nature, (2) children." Teachers are advised to watch children and to watch nature on the assumption that there is no other outline as good as these. In fact, says the outline, " there is no other outline for real nature study." Conditions do not permit any great support or supervision of the program on a state-wide basis.

At Kansas University at Lawrence, E. E. Bayles is in charge of science teaching in the department of education. He reports that nothing is being done for the training of elementary teachers at that institution. At the State Teachers College at Hays, L. D. Wooster is in charge of the work. He has been a rather prolific writer and has produced some interesting nature literature. In 1917, he produced a nature study bulletin and in 1925 a bulletin known as " Nature Studies, (Animals)" which should be very valuable to elementary school teachers and others interested in teaching of nature. About six hundred graduates of the Hays institution enter the elementary school service each year but only a small per cent will probably find themselves called upon to teach nature study. The program outlined in preparation for these teachers is general and emphasizes study of real things in their natural setting. At the Kansas State Teachers College of Pittsburg, O. P. Dellinger and J. A. Yates are respectively in charge of biological and of physical sciences. Seven faculty members are engaged in teaching science to the approximately five hundred individuals who enter the elementary school service from the institution each year. Apparently the institution is well equipped to do a satisfactory piece of work.

McPherson College has stressed nature work for some years in particular at its summer session described under Colorado, page 164.

Southwestern College sponsors an interesting " College on Wheels " which, during the summer months, tours through the eastern states visiting and studying important collecting grounds and stations. For information on this unique school one should write to William H. Goldsmith, Winfield, Kansas.

The following local communities of Kansas report work being done:

Augusta.—L. V. Davis and M. E. Rowe are in charge of science at the high school levels. There is no one person in charge of it below this rank. The weekly time allotment calls for twenty minutes in the third grade; thirty minutes each in the fourth and fifth, and forty minutes each in the sixth, seventh and eighth grades. These times are required but twenty minutes a week may be used in the first and the second. A weekly teachers' help is mimeographed and the work is correlated closely with language and with club work in the high schools. Home gardening is encouraged in all the grades.

Cherryvale.—J. P. Sheffield is in charge of the work at the elementary levels and Clifford Moyer at the high school levels. No time is required for science work though eighty minutes a week may be spent in each of the first six grades; one hundred twenty, in the seventh and eighth, and two hundred in the ninth. Correlation with geography is common. It seems difficult to secure adequately trained nature teachers.

Coffeyville.—Fifteen minutes a week is required in the first grade and one hundred a week may be elected for each of the second to sixth grades. Correlation with geography and reading is common.

Emporia.—A printed outline is followed though the only stated time requirement is three hundred minutes for the eighth grade. Correlation in the lower grades is common with geography and language. It has been found difficult to conduct successful field trips.

Louisville.—Edna Neher is the supervisor in charge of science work at elementary and high school levels. Correlation is made with civic science. A printed outline is followed though we have no record of definite time allotments for the lower grades. It is reported as being difficult to secure well trained teachers and a place in a crowded program.

KENTUCKY

Kentucky prescribes a state course of study in nature study work for the eight grades of the elementary schools. The State Geological Survey has issued some splendid helpful literature to be used as supplementary material. The most important of these contributions are " The Wild Life of Kentucky " and "Ancient Life in Kentucky." It is difficult to understand how any alert Kentucky teacher could read these books and not pass some of their inspiration and value on to the students.

The only teacher training institution of which we have current information is the Louisville Normal School. Here Mary May Wyman and Alma K. Brown have been in charge of teaching nature study to prospective elementary school teachers. Miss Wyman has been made supervisor of health and safety education of Louisville but maintains a close interest and relationship with the activities of the normal school. The nature classes of this institution care for about two hundred students and Miss Wyman has generously supplied opportunity for extra activities by sponsoring a Science Club, having ten afternoon fall field trips, four winter Saturday morning trips, and about fourteen spring morning trips. In addition, some supervision of work in the training school has been necessary. Work in nature study in the Louisville Normal School emphasizes life history more than most other phases of nature study.

The University of Kentucky maintains a Zoological Field Laboratory on a five hundred acre tract of typical mountain country in Breathitt County. Men only are admitted to this school which in 1930 held sessions from June 15th to July 24th and from July 27th to August 28th.

Returns from Kentucky communities follow:

Bellevue.—W. R. Sebastion is in charge of nature and science work in the elementary schools and George Wright in high schools. Time allotments call for forty-five minutes a week each in the fourth, fifth and sixth grades; ninety each, in the seventh and eighth grades, and two hundred and twenty-five in the ninth. A mimeographed outline is followed and correlation with geography in the grades is common.

Bowling Green.—J. S. Jackson is responsible for high school science and each teacher in the lower grades cares for the work. About twenty-five minutes per day is the average time given. The work is correlated with health and geography, but labors under the handicap of inadequate equipment.

Dayton.—Louis Desjardins is in charge of high school science and Earl M. Lamb, superintendent of the elementary school science. Time allotments call for fifteen minutes each in the first three grades; twenty minutes each in the fourth, fifth and sixth and ninety minutes each in the seventh and eighth. A printed outline is followed and no correlations are made.

LOUISIANA

Science has been recognized by the State Department of Education as a school activity from the first grade through the senior high school since 1905. The New Orleans Normal School and the state normal at Natchitoches have been particularly helpful in fostering the work for the first six years and Louisiana State University, Tulane University and Newcomb College have helped particularly at the high school levels. Six general supervisors have been responsible for state wide supervision which consists of all the ordinary types of supervision. Printed outlines totalling ninety pages are sent in the average year to about eight thousand teachers and other individuals.

Aside from work in geography and physiology there seem to be no requirements relative to nature or science teaching below the seventh grade. General science seems generally to be a requirement in most eighth grade offerings. Biology is required or elected in the ninth depending upon the course elected. Physics or chemistry may be elected generally in the tenth grade but one or the other is generally required in the eleventh. The work to be taught through the state is outlined in considerable detail in four bulletins issued by the state department. Bulletin 127 is a " Handbook for Teachers and Courses of Study for the Elementary Schools of Louisiana." Bulletin 158 outlines the " Essentials to be Mastered in Mathematics and Science " in the high schools and Bulletin 161 gives a statement of " Louisiana High-school Standards." These printed outlines are probably in the hands of ninety-five per cent of the teachers for whose use they are intended. The state outline is mandatory upon all schools except those of New Orleans.

Louisiana has a state adoption of text-books and some idea of what is taught may be gathered from the following list of science texts used: 1st grade, " Safety Hill of Health," Lummins and Schawe; 2nd grade, " Building My House of Health," Lummins and Schawe; 3rd grade, " Health Habits," Newmayer and Broome; 4th grade, " Primer of Hygiene," Ritchie and Caldwell; 5th grade, " Health Habits," Burkard, Chambers and Maroney; general science, " The Science of Everyday Life," Van Buskirk and Smith; biology, " Hunter's Civic Biology;" physiology and hygiene, Ritchie's " Primer of Sanitation and Hygiene;" physics, Carhart and Chute's, " Practical Physics;" chemistry, Hessler and Smith's "Essentials of Chemistry."

At the New Orleans Normal School, James M. McArthur, vice-president of the National Council of Supervisors of Elementary Science, is in charge of the training in science which those going into the elementary schools get. He also serves as part time director of nature study for the schools of New Orleans. In 1924, he issued an interesting bulletin on " Insect Study in Grade Schools for the Public Schools of New Orleans." This should have had much use in the schools. During 1929-30 he was in part responsible for the Mary F. Reames School Garden Contest and Insect Mounting Contest. Judging from the list of awards made we may say that this contest must have had far reaching effects and done much to stimulate work in nature education in the schools of New Orleans. The announcement of the contest was a twenty-eight page bulletin containing generous suggestions for carrying on some worth while school projects. Apparently these contests have been a regular event in the schools for seventeen years. The work taught in the courses in the normal school by Mr. McArthur apparently stresses landscaping and is featured by as many trips in the field as possible. Mr. McArthur has served a number of times on the staff of the normal school at Bemidji, Minnesota.

Louisiana has been fortunate in the matter of wild life sanctuaries and as the idea develops may recognize their value more and more. The State University has a Biological Field Laboratory located on Grand Isle, eighty miles below New Orleans west of the mouth of the Mississippi River. Here field studies particularly with marine animals are encouraged. The session for 1930 was held between June 13th and August 13th.

MAINE

The course of study concerned with nature and science in the elementary schools of Maine is under revision. It will probably be completed during the school year 1930-31 according to representatives of the State Department of Education. The course in force until the new outline appears calls for a time allotment of one hundred minutes a week for the first grade in geography and nature study; one hundred, for the second; one hundred and twenty-five, for the third; one hundred and fifty, for the fourth; one hundred, and seventy-five, for the fifth; and similar amounts for the sixth, seventh and eighth grades. The work suggested is seasonal and while it is possible to group grades it would be difficult to do so and still adhere to the outline. No one field of science is emphasized in any particular year of the elementary grades.

All the teachers in training for rural school work are apparently given work in nature study in their preparation. At the Aroostook State Normal School, Ida M. Folsom is in general charge of training elementary teachers in the fields of science. She is assisted in her work by Mr. Merriman and Miss Ames. About seventy-five of the graduates of the school enter the elementary field each year. Apparently, the courses taught in this school are limited to specific science fields rather than being offered in one general course. At the Farmington State Normal School, Charles S. Preble is in charge of nature work. About one hundred and seventy-five of the school's graduates enter the elementary field each year. The course in nature study is required and is a combination of content and method. It gets the students into out of door experience for about nine hours at least. A considerable number of extra and rather extended field trips are offered the students during the year. Attendance at these is not generally compulsory. Probably about forty of the two hundred students taught in a year attend these extended trips. There is much evidence from the report available that real materials in their natural setting are given considerable attention. At the Washington State Normal School at Machais, Frank M. Kilburn is in charge of the work in science and art. There is a smaller number of graduates from this school who enter the elementary schools each year, the number being about sixty. A course in nature study is required of students in their first year. The course combines content and method and has supporting courses in biology, earth science, health and sanitation and physics and chemistry. The work in the practice school at this institution is supervised by Mrs. Lelia Tripp.

The state is the home of Edith M. Patch, the president of the Entomological Society of America, and the author of many delightful nature books such as " Holiday Pond," " Holiday Meadow," " First Lessons in Nature Study," " Hexapod Stories " and " Bird Stories." Miss Patch combines admirably the ability of the serious scientist with the equally valuable ability of the teacher of young children.

She is State Entomologist of Maine with headquarters at Orono, Maine.

Mount Desert Island Biological Laboratory offers opportunity for trained students to study intensely some of the life of the state. Mount Desert Island is one hundred miles east of Portland on the coast of the state. Its varied topography offers excellent opportunity for a variety of studies.

We have few returns from Maine communities as to their nature work.

Brownville and Milo.—Ethel McQuarrie, Edith Artus, Verna Jordan, Erralard Jones, Vaughan Ketchum and B. D. Eldridge are the teachers here most interested in nature and science work. The time allotments are as follows: First, second and third, fifty minutes each; fourth to seventh, seventy-five minutes each. The work in the lower grades is frequently correlated with geography.

Eastport.—Lucy Kilby is responsible for the nature and science work in the elementary school and L. Brooks Varney for that at the high school levels.

Fairfield.—Witt Phinney is in charge of nature and science work in the elementary schools and A. A. Jarcelon of that in the high schools. It is reported as being difficult to secure adequate source materials.

MARYLAND

The State Department of Education of Maryland does not select a particular subject like nature study and carry out a program for its teaching on a state-wide basis. It is probable that the outline used in Baltimore is quite generally used elsewhere in the state. The City of Baltimore issued in 1929, an " Elementary Course of Study for Grades Four, Five, and Six." This tentative manual was apparently prepared with the cooperation of O. W. Caldwell of Columbia University. Its introduction calls particular attention to an elaborate test section such as is not ordinarily found in outlines of this sort. The content of the minimum requirements is arranged seasonally and includes such fields as trees, flowers, houseplants, the sun, gardening and so on. Curiously enough while at least three plant groups are given recognition in the minimal requirements, we find no vertebrate animals considered at any time except on an optional basis. For example, a fourth grade child might satisfy the requirements with fifteen plant lessons, four on the house fly and three on the sun but with no lessons on birds, mammals, fishes or insects in general. Similar criticisms hold for the other grades. In the treatment of optional topics, there appears to be a tendency to arbitrarily select consideration of definite species rather than suggest habit groups for which the teachers may select illustrative and local species. The manual represents a considerable effort on the part of those preparing it and should make many contributions to nature education. These will probably be suggestive rather than actual however. Some of the type lessons will be decidedly helpful to all who write outlines. Particularly helpful will be the suggested correlation activities in which correlation with literature, history, geography and music is made by specific references to standard manuals used in these various fields. It seems to the reviewer that this phase of the manual will prove the most valuable though the introductory paragraphs giving a survey of the various topics are in general splendid. In the activities sections, we find abundant suggestions for study topics and when all is said and done this is about all one has a right to expect of an outline. No outline written for any particular community can be used successfully bodily in another. It is hoped that the Baltimore outline may mark progress in the general field of nature education. A critical reader has difficulty in accepting the lauded test section with the assurance of the writer of the outline's introduction.

From reports of the normal schools and colleges of Maryland it would seem that graduates going into the elementary field receive less preparation in the field of nature and science than in the other accepted fields of elementary school study. In the courses required of elementary teachers in the Maryland State Normal School at Towson, all common plant and animal forms are studied in the fields or alive in the classroom. Minnie V. Medwedeff is the instructor in nature education at this institution. Counting geography and hygiene and elementary science we find seven faculty members of this institution teaching science to prospective elementary school teachers. Only one of these is concerned with elementary science or nature study. Miss Medwedeff, in addition to teaching classes in the normal school, supervises similar work in the practice school. The course taught is one in which content and method are combined. It is supported by courses in biology, earth science and hygiene and sanitation. At the Frostburg Normal School, R. M. Fretz, now of the Buffalo New York State Teachers College, was in charge of nature education for some years. The school graduates about seventy-five students a year who will probably be called upon to teach nature study or science in the elementary schools. These are required to take a course in nature study with supporting courses in biology and health. At Morgan College in Baltimore, Milton Calloway of the biology department has been responsible for teaching science to those of the college's graduates who will enter the elementary field. There are about ten of these each year. The normal schools are generally well equipped with apparatus and other materials useful to teachers in training. Each institution is so located that successful field trips may be conveniently made.

The details of the situation in Baltimore not of statewide significance follow. We have no returns from other Maryland communities:

Baltimore.—Laura Frazer has charge of nature work in grades one to three and C. E. Douglas of that of grades four to six. The high school work is in charge of John Coulburn. The only time allotment of which we have record concerns the fourth, fifth and sixth grades in each of which sixty minutes a week is required.

MASSACHUSETTS

In the 53rd Annual Report of the Board of Education, 1890, nature study is recommended as a course of study for the elementary schools of Massachusetts. The amount of time that shall be devoted to any school subject in the schools of the state is determined wholly by the local school authorities. The state makes no requirements either in its statutes or in the regulations of the State Department of Education. For about two years, a committee has been working on a new course. At the time this edition of the *Almanac* is going to press, this new outline is in a tentative, mimeographed form and will be considerably modified before it appears in its final form. Walter G. Whitman of the Salem Normal School is chairman of the reviewing committee for the new course of study in science for the elementary and junior high school grades. While the teaching of nature study or elementary school science is not mandatory in the schools of the state, the state department recommends that one hour a week be given the subject in each of the first six grades. Correlation with hygiene and geography is recommended. No state-wide supervision of science teaching is provided, though the state department helps in the preparation of the teachers' guides.

Professor N. H. Black in charge of science teaching at Harvard University writes that that institution has " not yet tackled the problem of training the elementary teachers in science." At the School of Education of Boston University according to Dean O. H. Wilde it has been found advisable to introduce a special course known as " College Science " to fill the needs of prospective teachers not cared for in the College of Liberal Arts. This course in ninety class hours gives a survey of the fields of chemistry, astronomy, physics and biology. It seems to be filling a great need satisfactorily. The course is designated as " a sincere attempt to interest the student in modern science and to stimulate him to further studies in this direction." At the Teachers College of the City of Boston, Dennis C. Haley is head of the department of science. Supervision of practice work in the institution is provided for by Charles Lamprey. About ninety of the yearly graduates of the institution will probably be called upon to teach science or nature work in the elementary schools. To prepare them for this, there are required courses in biology, hygiene and sanitation and nature study or elementary science. Each of the courses combines method with content. Apparently all satisfactory field trips must be made at some distance from the college buildings. The main themes emphasized are life histories, seasonal studies and food values. At the state normal at Lowell, Clarence Weed, long a leader in nature education, is principal. Mabel E. Turner is the instructor in biology and nature study and while Doctor Weed has emphasized insect study in his writings, Miss Turner has botany as her forte. During the summer she is also a member of the Nature Guiding School staff at Western Reserve University. The course in nature study or elementary science at Lowell is a combination of method and content. It emphasizes conservation, health, life history, seasonal studies, food values and physiological and ecological relationships. At the normal school at Fitchburg, J. L. Randall is in charge of the nature and science education work. Professor Randall was in charge of the war gardens of the United States government during

Lexington.—The time allotted to elementary science varies from thirty minutes a week in the first grade to seventy-five minutes in the sixth grade. The seventh and eighth have one hundred minutes each.

New Bedford.—The supervisor is Ellen C. Sweeney. No other information was given.

Newton.—Miss Wilder is supervisor. The work is correlated with language and drawing.

Northbridge.—Thirty minutes a week is allotted to elementary science in grades one to four and forty-five minutes in grades five and six, and two hundred minutes in grades seven to nine. It is correlated most frequently with geography and health.

Somerset.—Forty minutes a week is allotted in the sixth and seventh grades, eighty minutes in the eighth grade and two hundred minutes a week in the ninth grade.

Springfield.—Fannie Stebbins was long supervisor of nature study and general science at Springfield. She resigned in 1928 but before retiring left an elaborate tentative course in nature study and general science for the city's schools. This is well worth examining by those interested in preparing other outlines.

Warren.—The supervisor is Effie Agard. Nature work appears regularly thirty minutes a week in grades one to eight with forty minutes given to it in the ninth grade.

MICHIGAN

The present state requirements relative to the teaching of nature or science in Michigan are that it is required in correlation with the other subjects in the consolidated schools and that it make up a part of the required course in agriculture for the rural schools. General science is generally required in the eighth grade of consolidated schools and in the ninth of some schools. Physics and chemistry, either one or the other being optional, is required in most high schools and biology is required in the ninth grade and agriculture in the tenth in the consolidated schools. Adherence to the state outline is mandatory on the rural schools only. The state does not have state adoption of text books.

The state teachers colleges have been leaders in helping develop the teaching of nature study and science in the elementary schools and the state university and colleges have helped most at the high school levels. Supervision of the existing state program is made by actual school visitation, by the helping in the preparation of teachers' guides and by the receiving of reports at the end of the year of completed projects. There seems to be no requirement for the work below the seventh grade on a statewide basis. The suggested nature study work in the state outline is of the briefest sort and is purely of an outline nature. Dr. E. J. Cable's Planet Chart is reprinted from the Iowa Course of Study but this is the extent of the factual material included. It is suggested that the elementary grades be grouped so that grades one and two be taught together, that grades three to six inclusive be considered together and the seventh and eighth grades also be grouped together. It is suggested that the laboratory for the elementary grades be the out of doors and that nature study be not considered as being utilitarian. It is emphasized that nature study is to the child and for the child and from the child's viewpoint not to the teacher's mind or from the teacher's viewpoint. The state department outlines administration, means of selecting content, method of teaching, equipment and general professional references for the high school sciences such as general science, biology, geography, physics and chemistry. It is recommended for the biology that the practice of treating botany and zoology separately be discontinued. Bert J. Ford of the State Department of Education seems to be greatly interested in the further development of nature and science education in the state.

The University of Michigan has done more to help in science work in the high school levels than in the elementary field. According to Francis Curtis of the School of Education there is as yet no training of elementary science teachers being done at the University of Michigan. The university issued a useful bulletin on the trees of Michigan which has done much to help that phase of nature study. The college of forestry has for some time indicated that it recognized an obligation to carry on more layman education than was at present being done. The agricultural college has issued some very useful bulletins particularly those by Beal on the weeds of Michigan and the seeds of these weeds. The teacher training institutions have all recognized their obligations in training teachers for the elementary field but there seems to be some sign that emphasis is being placed on preparation for the upper grade levels and letting the lower grades take care of themselves. It is not within the province of this report to attempt to explain how this seems to have come about. Probably the most conspicuous work in nature education has been done at

Detroit Teachers College and at the schools in which we find these leaders, Theodosia Hadley, Helen Dolman and Mae Kroenig Woldt. These people have long been leaders in the national meetings interested in developing nature education in the schools. While it may be that the teachers' colleges of the state are increasing their enrollment considerably by assuming the role cared for by junior colleges in some states, they still find plenty of obligations to meet in the direction of teacher training work. At the Detroit Teachers College, Lenore Conover has for many years been responsible for training teachers to teach nature study as it is required in the first four grades of the city's schools. Miss Conover completed her service with the institution in June, 1930. The work offered at the institution has included a two-hour required course combining content and method for the kindergarten and primary teachers, a biological methods course of two hours credit, a course on life histories of plants and animals, a course on physical nature study with methods, a field course of one hour credit, a garden course of two hours credit, and a two-hour nature literature course. In addition, there have been geography courses naturally. Students attending the City College take a two-year program beginning September, 1930. They may elect any science along with cultural courses but are required to take a course in biological foundations and may elect courses in world problems in biology or world problems in physics and chemistry. Mr. C. L. Thiele, supervisor of mathematics and science of the city school system, will probably be influential in determining developments at the teachers college following Miss Conover's resignation. He has built up a strong staff of general science teachers and may spread his influence more obviously to the lower grades. Miss Conover's service has been decidedly creditable in that she has combined the spirit of inquiry with good common sense in recognizing the nature of the task she was asked to perform. She has never limited her influence. At the Western State Teachers College, Theodosia Hadley, former president of the National Council of Supervisors of Nature Study and Gardening, is in charge of nature education. She has had the assistance of Luverne Argabright and since both are able, indefatigable workers results are being secured. Miss Hadley has sometimes said that she did not see how much of nature education could be taught indoors. An examination of the course in nature study at this institution shows a general selection of topics including the fields of physical and biological science. Emphasis is placed apparently on conservation, recreation, life histories, seasonal studies, ancestry and physiological and ecological relationships. Apparently, the teachers in training are given practice in the use of terraria and instruments for visual instruction. At the State Normal College at Ypsilanti, Helen Dolman is in charge of the work in nature education. Dr. Sherzer, the head of the department, has always recognized the obligation of the institution to help in the preparation of teachers for the elementary field. He has also built up a strong science department whose members are not so much concerned with this phase of the work. T. L. Hankinson, for example, has made many worthy contributions to research in his chosen field of zoology as it is concerned with fishes. Unfortunately, there seems to be a tendency to develop away from the needs of elementary schools and many students are apparently diverted away from the work in nature study though the classes already are larger than the present staff should be expected to handle. Every report available on the work done by Miss Dolman indicates that she is performing a real service in a most commendable manner. At the Central State Teachers College at Mount Pleasant, Mae Kroenig Woldt is head of the department of biology. Teachers entering elementary school service from this institution are required to take work in nature study and hygiene and sanitation. The course in nature study is essentially one of content.

At least two important field schools are to be found in Michigan. The Michigan State College Course in Field Biology at the W. K. Kellogg Wild Life Sanctuary held its 1930 session from June 25th to August 1st. The courses offered were in botany, zoology and entomology. Nine college credits could be earned by those qualified to enroll. The University of Michigan Biological Station at Douglas Lake has made a name for itself in the realm of field biology. Here courses are offered in entomology, ornithology, ichthyology, herpetology, limnology, mammalogy, systematic botany, including the algae and bryophytes, plant anatomy and plant ecology. Credits earned at the station have full value at the University of Michigan. The 1930 session was held between June 30th and August 22nd. The Western State Teachers College at Kalamazoo runs a Field Course in Botany in the Black Hills and Yellowstone National Park. The 1930 dates were from August 8th to September 7th inclusive.

The reports from individual communities of Michigan reflect the good work done in leadership training in the state.

Adrian.—Thirty minutes per week are required in the first and the second grades and sixty minutes in each of the succeeding seven grades. Effie Alexander is supervisor of the work in the elementary grades and E. J. Reed at the high school levels. Correlation with geography is made and a new course is being developed.

Alma.—Lulu Stone is responsible for the work in elementary grades and D. D. Yoder at the high school levels. Definite correlation with other subjects is recommended. Time allotments call for sixty minutes a week in the seventh; ninety, in the eighth and three hundred, in the ninth. A course of study is needed for the elementary grades of the city.

Battle Creek.—E. M. Brigham is responsible for elementary school science and Paul A. Rehmus for high school science. Work is definitely correlated with geography and English.

Birmingham.—Clarence Vleit is responsible for elementary school science and W. S. Toothacker for the high school work. Twenty minutes each is allotted to the work in the first four grades and twenty-five each in the fifth and sixth grades. Correlation with geography, reading and language is common. It is reported as being difficult to find time to do the desired work in this field.

Detroit.—Lenore Conover has been responsible for elementary school science and C. L. Thiele for intermediate school science. The time allotments call for one hundred and twenty minutes a week in the first and second grades; thirty each, in the third and fourth and one hundred and twenty each, in the seventh, eighth and ninth. Correlation with the social studies is common in the lower grades. Facilities for the teaching of the work are increasing each year. All new buildings contain a well equipped nature room with a conservatory. The latter has planting benches to make possible active participation in plant growing for all pupils. Running water aquaria and animal cages accommodate both water and land animals for study while alive. The building and grounds department and the city garden department furnish garden facilities under most attractive plans and organization. To date, about forty school gardens are operated under garden directors from the city garden department with the cooperation of nature teachers. During spring, summer and fall about 2,400 school children belong to the garden clubs and about one-third of these keep complete records of their garden experiences in home or school gardens. One of the latest schools has added, in a natural setting, a wild flower garden and the nature instruction is including wild flower conservation in a very practical way. Audubon clubs in some schools and nature clubs in others include in their membership pupils from all elementary grades, often through the seventh and eighth. Accordingly in spite of the fact that only a maximum of one hundred and thirty-two minutes per week may be regularly given to class work in the first two grades and thirty to forty in the next two, a large number of pupils are engaged in nature activities over a longer time. Initial and final tests are given in nature study to all pupils in the second grade not as a basis of promotion but as a check to determine the interest through certain factual and thought by-products. Nature study has been transferred from the social science department of the board of education to the exact science department recently. A printed course of study in general science for the intermediate grades has been prepared and put in use. Man's use of the environment is one of the main viewpoints expressed in this outline. These concern themselves with problems of forestry, as for example, consideration of how man uses nature's materials in building and how he obtains and uses the fuel materials of the earth. The outline was prepared by C. Louis Thiele and Martha B. Quick and is generally excellent. It is difficult to see any difference in a majority of the material from that which is accepted as the best of nature education even though the material appears here under the title of general science. The course was published in 1927.

Fenton.—William J. Burhitt is in charge of the elementary school science and John Delavan of the high school science. Correlation in the lower grades with language and reading is common. The weekly time allotments follow: First and second, sixty minutes each; third and fourth, ninety minutes each; fifth and sixth, two hours each; seventh, eighth and ninth, two hundred minutes each.

Flint.—Nature or science work in the lower grades is correlated with art, literature, language and geography according to Hazel B. Minore, director of elementary education. The supervisor of the general later elementary grades is Olive Smallidge and Grace Bagby serves as supervisor or is responsible for the science at high school levels. The weekly time allotments call for fifty minutes each in the second and third grades and seventy-five minutes each in the fourth, fifth and sixth grades. It seems to be difficult to secure adequately trained teachers for the school system but in spite of this the director of elementary education feels that there are few cities that give as much attention to general science in the grades as is the case at Flint. The new outline for the city is in mimeographed form.

Grand Rapids.—Nature and science work in the elementary grades is under the supervision of the general supervisors. One hundred minutes a week is allotted to the work in the third grade; sixty, in the fourth, and fifty each in the fifth and sixth. Correlation with geography is common. There seems to be good cooperation and help between the schools and the city museum where Dr. Dana is director and Mr. Dumond generally responsible for the nature study work.

Hastings.—Helen Wade is supervisor of nature work in the elementary grades. The work is generally correlated with language and geography and the time allotment per week is as follows: First grade, seventy-five minutes; second and third, one hundred minutes each; fourth, fifth and sixth, forty minutes each.

Ionia.—Nature study readers are used as a basis for nature work in Ionia. Mimeographed outlines are followed to a considerable extent.

Kalamazoo.—Zoe C. Shaw is supervisor of the later elementary grades and W. F. Head, of the high school science work. Weekly time allotments call for seventy-five minutes each for the first six grades; three hours each, for the seventh and eighth and five hours for the ninth grade. There is correlation with geography and language in the elementary grades.

Mount Clemons.—Carrie Moon is responsible for the science work of the elementary grades and Glenn Blough for the high school science. Time allotments call for twenty minutes each in the first three grades; thirty minutes each in the fourth, fifth and sixth grades and two hundred minutes each, in the seventh, eighth and ninth grades. Correlation with health and geography is common. It has been found difficult to secure adequately trained teachers in the field of science.

Munising.—H. A. Wood is responsible for science in the elementary levels and Kathleen Shingler at the high school level. Time allotments call for forty minutes a week in each of the first six grades; one hundred, a week in the seventh, and two hundred and twenty-five in the eighth.

Niles.—Ella Champion is grade supervisor responsible for elementary school science and Frank McCally and Russell Paine, for work at the high school levels. Time allotments call for sixty minutes a week in each of the first three grades and seventy minutes each in the next three. Correlation with language and literature is common and it is stated that it is difficult to secure adequately trained teachers.

River Rouge.—A. McDonald is responsible for elementary school science and Arthur Sweet for that at high school levels. Time allotments call for seventy-five minutes a week in each of the first two grades; one hundred twenty, in the third; one hundred thirty, in the fourth; one hundred thirty-five each, in the fifth and sixth and forty-five each, in the seventh and eighth. It is reported as being difficult to get the children out into real nature of the open country. Correlation with geography is common.

St. Joseph.—Mrs. Alice Bennett is responsible for the work in the lower grades and S. M. Quigley for that at high school levels. Time allotments call for twenty-five minutes a week in the first grade; thirty minutes each, in the second and third; forty minutes each, in the fourth and fifth; fifty, in the sixth, and sixty minutes each, in the seventh and eighth. Correlation with reading and geography is common and the poor preparation of teachers is the greatest obstacle to success.

Ypsilanti.—C. H. Osgood and Howard Ivens are responsible for the science work at high school levels and the teachers of general subjects of the work at lower levels. A mimeographed outline is used in which reading and the social sciences are generally correlated with nature and science.

MINNESOTA

In justifying the inclusion of work in nature study in the curriculum of the elementary schools of Minnesota, the authorities state that " in no other subject is it so easy to strengthen the child's natural sensitiveness to beauty and reverence and to increase his regard for the necessity of law and order." We find the study known as " environment " not nature study or elementary school science or science. The materials published in the state outline are seasonal but from the standpoint of use in rural schools are subject to practically the same criticism made in the account of the Iowa outline. A rural teacher or a city supervisor having responsibility for many grades would find it a considerable problem to supply the suggested material for study on a given day. These criticisms do not hold in connection with using the outline in a situation where the teacher has responsibility for but a single grade. The time allotment for work in "environment," in addition to geography follows: thirty minutes a week, in each of the first three grades; forty minutes, in the fourth and fifty minutes each, in the fifth and sixth. This program is followed by agriculture in the seventh and eighth grades; general science, a constant for the ninth; general biological science for the tenth and physics and chemistry as electives for the eleventh and twelfth grades.

In the lower grades, correlations are urged where possible with geography, reading, language, history, industrial arts and health. It is urged that in the lower grades little equipment other than terraria and aquaria be used since the study is to be one of the environment and not representations of the environment. Grade groupings are suggested in which the first and second, the third and fourth and the fifth and sixth grades are recognized working units. It is suggested that the first and second grade work be primarily one of recognition and directed observation; that the third and fourth grades be primarily a period of original investigation supplemented by simple reading and classification and that the fifth and sixth grades involve considerations of relationships, generalizations and conclusions. Science broadly interpreted in the Minnesota elementary school curriculum includes geography, physical education, health education and agriculture. In the environment study, no particular viewpoints or particular fields of science seem to be emphasized in any particular grades. The high school subjects are outlined in two bulletins, one dealing with general science and general biological science and one dealing with physics and chemistry. These were prepared by a committee whose chairman was S. R. Powers.

Minnesota has produced a number of strong teacher training centers. The books and outlines written by Gilbert Trafton of Mankato State Teachers College are standard wherever elementary school nature or science are known. At Mankato, there is a required course in nature study or elementary school science which combines content and method and offers field work, laboratory work and recitation. The main vocational emphasis is around forestry and agriculture. At Bemidji State Teachers College, C. H. McClintock is the instructor responsible for nature work. We find there required courses in biology, nature study and health and sanitation. At St. Cloud State Teachers College, George W. Friedrich and W. C. Croxton are responsible for the work, the former being particularly interested in the training of elementary school teachers. Required courses here are to be found in earth science, nature study and hygiene and sanitation. Experimental work dealing with the merits of field work is being carried on at St. Cloud. At the University of Minnesota the interest in the School of Education centers around the training of science teachers for the secondary schools. Miss Jennie Hall of the Minneapolis public school system, however, serves as instructor in nature study. The students in her classes must hold teachers college certificates and have had three years successful teaching experience. The students in the class are largely teachers of the city who are in service at the time. Other teacher-training leaders in nature education in Minnesota are Caswell A. Ballard of Moorehead Teachers College, who conducts his summer classes in camp, William Munson of Winona Teachers College, and Charles Frazzee of Duluth Teachers College.

Minnesota is a state naturally suited to successful nature education. Its lakes are almost too many to count. It is rapidly becoming a mecca for summer tourists, many coming north to escape extreme heat, hay fever and other unpleasantness of the south country. It is beginning to recognize the value of these migrants to the state and is setting aside areas which will become increasingly attractive as wild life has the opportunity to re-establish itself. Ernest C. Oberholtzer has written many attractive articles in American Forests and Forest Life of the lure of this part of our country. It would seem that the move to establish a large national park in the area for recreational purposes had considerable merit. The Izaak Walton League is doing much to establish such a park on the Minnesota Ontario borderland. The area in mind covers some ten million acres and contains more than three thousand connected lakes.

Accounts of Minnesota communities follow:

Chisholm.—Agnes F. Hatch is elementary supervisor in charge of nature study and W. A. Porter and H. S. Hanson are in charge of high school science. The work in the lower grades is correlated freely with reading, geography and hygiene. The weekly time allotments are: Forty minutes each, in the first and second grades and fifty minutes each, in the next three. Correlation with other subjects is common in the sixth, seventh and eighth grades.

Detroit Lakes.—Lucy L. Kinsley and Margaret Losso are the leaders in nature education in the schools.

Duluth.—A definite time allotment is given each grade from the first to the eighth and correlations are frequent.

Eveleth.—Nature work is given regularly in the lower grades correlated freely with geography and language.

Fairmont.—Marion Grimsrud is in charge of high school science. No time is required in the lower grades but seventy-five minutes a week may be elected in each of the first two grades and one hundred and fifty minutes in each of the next two.

Hibbing.—Charlotte Hunter is in charge of nature study in the first three grades and M. I. Smith of the work in nature study and agriculture from the fifth to the eighth. H. R. Dresher assumes the responsibility from the ninth to twelfth grades. The required time in the various grades is as follows: Ninety minutes a week in the fifth grade; one hundred minutes each, in the seventh and eighth and two hundred and fifty minutes, in the ninth. More time may be elected in the lower grades. The work is freely correlated with geography. Mr. Smith has made a feature of using the motion pictures as a means of nature education. He has used particularly the DeVry School Films in the program he has outlined. The films are for the most part rented and are shown to as many children as possible while they are available. They are selected so that they may be seasonal and correlated with what is happening in nature at the time.

Hopkins.—The state course of study is followed. Mary Gilpin is responsible for the work in the first six grades and Lillian Foss and Hildred Oberg at the high school levels. Correlation with geography is common.

Minneapolis.—Jennie Hall is supervisor of nature study in the lower grades and L. N. McWhorter is in charge of science in the high schools. The work is carried on in the lower grades with two objectives; first, to familiarize the children of these grades with their natural and scientific environment and second, to develop with these children the scientific habits of thinking. To accomplish these, the work in science has been made to permeate the daily work. No time is designated for nature work in the lower grades but instead it becomes the center of interest in a large number of primary activities. The records kept by the children become both language and reading lessons. In the fourth, fifth and sixth grades experimental work is being done to determine the interests of the pupils. Club work has been found satisfactory in many ways because of the stimulus it has for urging the child to self expression. In the fourth grade, the home city is studied, the latter part of the year becoming concerned with the home state. In this connection, studies are made of the fur-bearers, the trees, the birds and the herbs. In the fifth grade, the studies are largely social and are concerned with organisms as foes or friends. In the sixth grade, the study of the influence of science on history is stressed. The work in the lower grades was responsible for the development of the Gordon and Hall, Holtz and Hall and Albright and Hall readers. These have been used successfully in many cities outside of Minnesota. The outline for use in grades one and two may be secured in printed form.

Northfield.—The weekly time allotment for nature or elementary science is ten minutes for the first grade; fifteen each, for the second and third; twenty, for the fourth; twenty-five each, for the fifth and sixth; sixty each, for the seventh and eighth and three hundred, for the ninth. Correlation with language is common. No outline is followed.

St. Cloud.—An extensive program is being developed under the direction of the nature study department of the St. Cloud State Teachers College. Particular emphasis is placed on outdoor activities. R. H. Brown superintendent and Martha Van Brussels grade supervisor are encouraging the work.

South Saint Paul.—Bernard V. Beadle is nature and garden supervisor working in the lower grades. The weekly time allotment is fifteen minutes each in the first and second grades; twenty minutes each, in the third and fourth and thereafter through the elementary grades the work is involved with geography. A printed outline is followed which correlates the work with reading.

MISSISSIPPI

We have no record of a state-wide course in nature education for use in Mississippi. The Agricultural College is doing something to encourage the work through that taught in the zoology department and in the department of agricultural education under Prof. Cyril Cain.

At the Hattiesburg State Teachers College Oliver V. Austin is head of the department of science and has long recognized the obligation of the institution to give training suitable to the needs of elementary teachers. There are five members of the staff who teach science to prospective elementary school teachers. In the practice school, G. M. McClendon and John M. Frazier are responsible for demonstration work and supervised practice in science. The regular four-year undergraduates may take four years of undergraduate science with methods in the major field being compulsory.

Only two Mississippi communities indicated that they were doing any work in the field of nature education.

Rowley.—The work is elective except in the third grade.

Columbus.—Mrs. A. Sale and Mary Strohe are in charge of the nature work in the grades and Mrs. Vina Kate Cole has high school responsibility. Forty-five minutes each is required weekly in the seventh, eighth and ninth grades. The greatest difficulty according to the administrators is the lack of trained elementary teachers.

MISSOURI

In 1929, the State Department of Education of Missouri published "Courses of Study for Elementary Schools" designed apparently as a basis for work in communities without regular courses for themselves. The courses were revised by the class in Curriculum Construction of the University of Missouri. The revision is quite different from the course reported in the last edition of the Almanac. It is designed to provide work in elementary science for the first four grades and provides a place in the daily program for the work if correlated with reading and language though ten minutes each day is allowed for the third and fourth grade group working together. The course as it stands is distinctly of the type outlined by Jackman and raises questions with few suggestions relative to the answers. Each of the major fields of biological science but little or none of physical science is represented in the suggested work of each grade for the year. The work of a year is divided into quarters and in each quarter the major units such as birds, trees, flowers and so on are treated. No suggestion is made as to assigning major viewpoints for development during any particular time. It is suggested that "so far as possible the topics in elementary science should be correlated with other subjects."

At the University of Missouri, Dr. Ralph Watkins has been in charge of science education. He has served as chairman of the committee responsible for the science syllabus appearing in 1927 as Bulletin 7 of the State Department of Education and designed for use in the junior and senior high schools. Dr. Watkins was chairman of the general science committee; A. F. Ewers of Harris Teachers College, of the biology committee; J. E. Wildish of Kansas City, of the chemistry committee and E. T. Miller of Hannibal, of the physics committee. Each of these committees prepared what seem to be generally workable programs involving problem-solving for the most part. Other useful reports prepared by the state department include those on geography issued in 1928 known as "Geography" and "Principles of Practical Geography." Another on "Agriculture" may appeal to many readers of the Almanac.

The work at the University of Missouri has apparently centered around problems of the secondary schools. Dr. Watkins has published much on the problems associated with equipment, expenses, and high school schedules which will be of value. He apparently has recognized the obligation of those working in well-supported institutions to prepare students so that they may, if called upon, succeed in less well supported communities.

At the Harris Teachers College in St. Louis, C. H. Philpott is in charge of the work in nature study but we have no detailed report of the activities. The institution, however, has a heritage of nature education that is enviable. At Kansas City Teachers College, A. E. Shirling is responsible for nature work. Mr. Shirling has published a number of interesting things, one of the most attractive being a supplementary reader. There are four required courses having a bearing on training nature teachers offered at Kansas City Teachers College. These are in biology, nature study, earth science and hygiene and sanitation. The topics considered in nature study are predominantly in the field of biological science. As might be expected in an institution training for service in a large city the work is presented with commerce and industry in mind but agriculture and forestry phases are also presented. Practice work at this institution is done in the schools of the city rather than in a special practice school.

At Southeast Missouri State Teachers College at Cape Girardeau, A. C. Magill is in charge of nature work. The course in nature study offered at the institution is elective but students are required to take biology, physics, chemistry or geology with additional elective work. The course in nature study or elementary science is largely content and matters of method are not considered. Mining, commerce, agriculture and forestry are involved in the content presented. At the Northeast Missouri State Teachers College at Kirksville, W. J. Knobbs is in charge of the classes in nature education. In a curriculum just put into effect at that institution, there appears a separate course for elementary teachers and another for rural teachers. In each, nature study is required. The course is made of three parts, each with two and a half hours credit. The first is given in the fall by a chemistry specialist; the second in the winter deals with physics and geology and the third in the spring deals with biological nature study. The course here considered is essentially a content course. A methods course offered in the department of education devotes about one-third of its time to methods in nature study and elementary science.

Missouri communities submit the following reports of activities:

Hannibal.—Since the last issue of the *Almanac* nature work in Hannibal has been completely reorganized. As it stands nature work is now integrated throughout the elementary school offerings.

Jefferson City.—The state outline is followed closely in the first six grades with close correlations between nature work and geography and agriculture. Ruth W. Moore is a leading nature teacher.

Kansas City.—C. L. Quear is responsible for the nature work in the first six grades and J. L. Shouse for that of the upper grades. Required weekly time allotments call for ten minutes each in the first two grades; fifteen minutes each, for the third to seventh inclusive. In all cases, double the required time may be used. Correlation is common with art and geography. The work is of course integrated closely with that of Albert E. Shirling of the Kansas City Teachers College.

Monett.—Cora Sharp is responsible for the science work at high school levels. There is no correlation with other subjects and the program followed is printed. A weekly time allotment calls for seventy-five minutes each in the first three grades; one hundred each, in the next three and one hundred twenty, in the seventh. It is reported as being difficult to secure well trained teachers.

Marshall.—We have no records of work in science at Marshall below the seventh grade. In the seventh and eighth grades, one hundred and fifty minutes each are allowed for science each week and in the ninth, twice that amount. The administration is considering introducing work at the lower levels in 1930-31.

Poplar Bluff.—The science work at Poplar Bluff is carried on without correlation with other subjects.

St. Louis.—One of the most satisfactory and complete outlines for study of science from the kindergarten through the grades of the senior high school is that to be found in use in St. Louis. Curriculum Bulletin No. 7 deals with science for the kindergarten and grades one to six. The material is presented definitely yet with ample provision for the selection of local material. Since it is wisely suggested that nature study is the study of things not about things there probably is a legitimate excuse for not providing reference authority other than the things themselves. If there is any way in which the reviewer would suggest improvement it would be in the direction of providing *for the teacher's* benefit at least a few printed references outside the outline, where the teacher's and pupils' experience might be enriched. To clarify this criticism let it be pointed out that in one unit the teacher is asked to have the children look up the relationship between the clam and the river perch. The problem would be more likely to yield satisfactory results if there were some assurance to the teacher that suitable reference material was available to make the child's efforts fruitful. This comment should not be taken as serious criticism since the whole outline is one which should yield suggestions to others interested in preparing outline material. The plan of organization calls for specific objectives, suggested activities, suggested procedures and desirable outcomes of all units. The matter is not handled in such a manner that the system becomes cumbersome. There seems to be little suggestion for review work or in the upper grades of showing the teacher, at least, how the problem in question has been integrated with that which preceded it either immediately or in previous years. In spite of these shortcomings, the outline is one of the best to be found in the country if not the best. As it stands, it is not suitable for use in school systems in which the teacher has responsibility for more than one grade. The science for grades seven, eight and nine is essentially general science though it does not go by that name. The same organization followed for the earlier grades is followed here. The curriculum bulletin Number 14 provides the outline for these grades. Biology is cared for similarly in bulletin 30; physics, in bulletin 31 and chemistry, in bulletin 32.

MONTANA

A tentative outline for a course in nature study for use in the elementary schools of Montana was issued in 1927 by the State Department of Public Instruction. The courses outlined are followed in the graded and rural schools throughout the state according to the state superintendent. Some of the larger school systems have a separate period for nature study but it is more general throughout the state to correlate nature work with the other subjects. In the seventh and eighth grades, agriculture is taught as a separate subject. The teachers of the Smith-Hughes agriculture are working with the rural and elementary teachers to formulate a more definite procedure to teach nature study and agriculture in the state to elementary school pupils. It has been found that most of the elementary teachers find it hard to select projects, laboratory exercises and materials for field trips that will make their work interesting and practical at the same time. To help in correcting this situation the agriculture teachers have held teachers conferences in the regions where they work. This and other bits of information bear out the statement that in Montana, at present, nature study work is in the formative stage.

The state outline in question is more suitable for use in situations where teachers have responsibility over a single grade than in the one room rural school. The work as outlined is seasonal. It does not specialize on any field of science in any particular year but it is not so organized for example that the autumn materials for the first and second grades or for the other adjacent grades have much if anything in common. The suggestions for the specific grades are, in general, practical and while the results or rather answers sought might be secured by consulting any of the abundant and specific references they can also be secured by following the equally specific directions for the study of real materials. A valuable appendix is found in connection with the outline in which directions for making insect collections, the making and stocking of an aquarium and similar activities are outlined. There is also appended a useful check-list of common Montana wild birds and wild flowers. The general list of references and readers should be valuable anywhere but particularly in any of the mountain states considering the preparation of similar material. The outline prints ninety pages and was prepared by a committee whose chairman was Walter L. Conway of Kalispell, Montana.

We have no returns from teacher training institutions in Montana and but very few from the local communities. The University of Montana conducts a field biological station at Flathead Lake near Polson. Information concerning this may be secured from M. J. Elrod of the University of Montana, Missoula, Montana. The returns from the communities follow:

Anaconda.—The responsibility in regard to nature and science work rests with each teacher. There is a weekly time allotment of ten minutes in each of the first nine grades with no printed outline or other outline being followed. Neither is there any correlation with the other subjects offered in the schools.

Missoula.—Nature work is taught as incidental to geography, health, reading and language.

NEBRASKA

A brief course in nature study is outlined for the first two grades in an elementary course of study issued by the state in 1929. A course in agriculture has been given in the seventh and eighth grades since about 1900. Nature and science work has been recognized as a school activity and taught in connection with agriculture and in many projects connected with other subjects for several years. Nature study has been taught in the teacher training institutions and has been accepted for primary teachers in the place of the biology requirement in some of the Nebraska teacher training institutions. The state outline for nature study correlated with English for the objectives, suggested activities, suggested procedures and desirable outcomes of all units. The matter is not handled in such a manner that the system becomes cumbersome. There seems to be little suggestion for review work or in the upper grades of showing the teacher, at least, how the problem in question has been integrated with that which preceded it either immediately or in previous years. In spite of these shortcomings, the outline is one of the best to be found in the country if not the best. As it stands, it is not suitable for use in school systems in which the teacher has responsibility for more than one grade. The science for grades seven, eight and nine is essentially general science though it does not go by that name. The same organization followed for the earlier grades is followed here. The curriculum bulletin Number 14 provides the outline for these grades. Biology is cared for similarly in bulletin 30; physics, in bulletin 31 and chemistry, in bulletin 32.

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At the University of Nebraska, Herbert Brownell has played an important part in science education as it pertains to the secondary field. A course in nature study was formerly offered by him in the Teachers College of the university but that has been discontinued for a course offered by the department of zoology. There, a three-hour course is given dealing for the most part with ornithology. Mr. Brownell offers two courses in Teachers College dealing with the content of science. One is a survey of the biological field and one a survey of the field of physical science. They cover " what everyone should know " in the pertinent fields. At Kearney State Teachers College, Carrie E. Ludden is in charge of the nature education work. At that institution, all of the two hundred yearly graduates have taken six hours of biology and six hours of physical education including hygiene and sanitation. The forms covered in the biology field are varied and are studied in the field as well as indoors. At the State Normal School and Teachers College at Wayne, Charles R. Chinn is responsible for the nature work. His report of activities is delightful reading but too long to publish here. Nature study seems to be popular at the school but meets with administrative difficulties so that it is limited to those taking the primary and kindergarten courses. The work in the training school and in the college seems to be widely separated, which makes it difficult for the college teachers to measure the effectiveness of their own work. This situation is by no means peculiar to Wayne. The physical equipment for doing satisfactory work seems to be adequate. The content of the nature study course seems to be almost entirely biological.

We have returns from but one Nebraska community concerning the work done. An examination of the educational survey of the state shows no nature supervisors in any of the state's communities and special science teachers only at the high school levels. These are to be found only in the larger communities. In two cities, with ten or more supervisors of grade work there are no science supervisors and in one smaller community supporting three music supervisors there is no science supervisor. The community reporting is Beatrice.

Beatrice.—There is no elementary science supervisor. Superintendent Burnham is, in general, responsible for the science work of the whole system. At the high school levels, H. M. Garrett is a teacher of botany and science. R. B. Thornton teaches general science and Jessamine Fugate teaches mathematics and science. The weekly time allotment calls for eighty minutes each in the first three grades; ninety minutes each, in the fourth to sixth grades inclusive and one hundred minutes each, in the seventh and eighth grades. Two hundred and fifty minutes are allowed for the science of the ninth grade.

NEVADA

Nevada is the only state in the Union from which we have received no data in addition to that available three years ago. Apparently the work in nature education being done in the state is negligible.

NEW HAMPSHIRE

Nature and science work has been recognized as a school activity of the elementary and secondary schools by the State Department of Education since 1905. General science in the junior high school has been fostered by the Keene and Plymouth normal schools. A state high school agent, R. H. Levitt, visits all the classes taught in science at some time in the year. He also helps in connection with teachers' guides. Rural teachers in training secure six semester hours of training in science. This is the same as that required of grammar school teachers, elementary school teachers and primary teachers. Junior and senior high school teachers are required to have twelve hours of science. At the normal schools, in summer, professionalized content courses are offered in science. A syllabus in elementary science and in secondary school science is now in process of considerable revision. The time allotment required by the state outline calls for seventy-five minutes a week in science in the first, second, third and fourth grades and ninety in the fifth and the sixth. General science is required in the seventh and eighth grade with a time allotment of one hundred and eight minutes. Two hundred in the ninth may be offered. Biology, physics and chemistry appear in the tenth, eleventh and twelfth grades with two hundred and eighty minutes allotted to each. The state outline is suggestive and not mandatory. It is generally adopted throughout the state. There are no state adopted texts. The New Hampshire communities heard from follow:

Franklin.—Edward Betz is high school science supervisor. Twenty-five minutes are required each week in the first and the second grades; thirty, in third, the fourth and the fifth; twenty, in the sixth grade.

Hanover.—Anna H. Blossom is high school science supervisor. No definite time is required. The state outline is followed.

Laconia.—John S. Gilman is high school science supervisor. The weekly time required is one hundred and twenty minutes in the seventh and the eighth grades. Two hundred and forty is permitted in the ninth. Correlation with English work is common.

Somersworth.—J. Francis Francoeur is high school science supervisor. The only time requirement seems to be two hundred minutes a week in the ninth grade.

NEW JERSEY

Since the last issue of the Almanac, New Jersey has issued some interesting literature concerning nature education. The most important of these is probably "The Teaching of Nature Study and Elementary Science for Grades Kindergarten to Eighth." This appeared in July, 1929. Part one of this monograph contains general directions for its use and a discussion of the problems in the teaching of nature study and science. Part two contains a definite course of study in which the units of science are considered from the standpoint of goals of achievement, subject matter and activities, procedure and method and bibliography. In general, the kinds of things to be studied may be selected locally from types suggested in the outline and in general the same materials may be studied in the different grades from different viewpoints. There does not always seem to be a closely knit relationship between grade groups to show that the activity of a given grade is to any extent dependent upon previous activities in other grades. Instead, most activities seem to be more or less isolated though they are parts of obvious immediately considered units. The materials are arranged seasonally for the convenience of the teacher and in general the units are well chosen. The activities of the seventh and eighth grades are essentially those of general science. In the general introductory section the type lesson is such that one is convinced that the committee which prepared the outline appreciated the value of having an outline sufficiently flexible to take advantage of opportunities which might arise spontaneously. The type lesson is built around a wood terrapin which was brought to school by a member of the class. The assumption is that this was done voluntarily. It is obvious that in general the type lesson is built around observation of an actual turtle though for some reason or other the fable of the hare and the tortoise is brought in to stimulate interest in the locomotion of the creature. There is no evidence in the questions quoted that such stimulus was needed. The lesson ends with suggestions that the children seek additional information in library books. It does not suggest where second grade children might be expected to find appropriate library references on the wood terrapin. The outline is a valuable source of suggestion to anyone interested in writing other outlines. It should encourage similar efforts in other states and will undoubtedly be modified as use indicates modifications that are desirable. The state of New Jersey also published in September, 1927, a valuable " Course of Study in Biology " for use in the senior high schools. This is essentially a skeleton outline of desired content.

Of New Jersey's five state normal schools, three are here considered. Upper Montclair has been made a four-year normal and is training teachers for the secondary schools only. Dr. Charles Finley is largely responsible for the strong course in science which has developed at Upper Montclair. Other science teachers on the staff include E. R. Glenn, Charles E. Hadley and R. D. Reed. Practice is provided in the institution itself and in various nearby high schools. At the Trenton State Teachers College, Dr. W. L. Eikenberry is head of the science department. He is assisted by Victor Crowell and others including Lois Meier, who has charge of training for the elementary grade levels. The course in elementary science is a required course stressing content in the first year and method in the second. The work taught is designed to a considerable extent to help prospective teachers use the newly developed state outline. At Newark State Normal School, Laura Woodward Abbott is in charge of nature study teaching. Opportunities for development seem to be great because of changes in the teacher training system of the state and because of local administrative readjustments. The first-year work consists of twenty weeks of biological nature study followed by a similar period devoted to physical nature study. The third-year course in methods is to be ten weeks in length with four hours work each week. Elsa B. Decker shares teaching responsibility with Mrs. Abbott. At Glassboro State Normal School, John B. Sangree is head of the science department. The course in nature study is designed essentially to train prospective teachers in the use of the new state outline. Required courses in biology and nature study are offered at this institution. The program is, however, largely in a state of readjustment and cannot be satisfactorily reported at the present time.

The communities of New Jersey indicate that more than the average amount of work in nature education is being done. These reports follow:

Bayonne.—In 1924, Bayonne published a Course of Study in Science for junior and senior high schools. The weekly time allotments follow: Eighth grade, four periods; ninth, three periods. General science is offered as introductory work. The outline is purely a topical study with short, suggestive activities, questions and problems. Biology is offered for the tenth year and is similarly organized, the course being definitely divided into botany, zoology and physiology. Some unique classifications appear in the outline notably that of studying moral character in botany. Physics is offered for the eleventh year and chemistry is offered for the twelfth.

Boontown.—Irene D. Swart is the supervisor of the elementary grades and Leslie A. E. Booth is in charge of the secondary school science. The weekly time allotment is as follows: Thirty minutes each, in the second through the fifth grades; forty-five minutes each, in the sixth and seventh;

two hundred, in the eighth. There is no definite outline followed at present.

Camden.—Margaret Aherne is supervisor of elementary science and of junior high school science. Time allotments call for twenty minutes in each of the first three grades; twenty-five each in the fourth and fifth; twenty-five to fifty-five in the sixth and fifty-five in the seventh; eighth, one hundred and ten; ninth B, two hundred and seventy-five. Field work is difficult to conduct because of physical and administrative difficulties. Work in planting trees in the city parks is stressed and carried on with the cooperation of the state forester. The new state outline is proving of considerable help particularly because of its suggested correlations.

East Orange.—Emma Davis has been the city's nature supervisor for the elementary grades and Silas Lottridge for the secondary levels. The work was introduced in the third and fourth grades through the medium of mimeographed letters to the children supplemented by material for the teacher. A course of study for the first four years was prepared. Three sections of the course are based on the seasons, one on activities for the whole year, and one on activities for any season. No time allotment is allowed for nature study or elementary science work and no provision is made for field work or for excursions. The work is to carry on without special supervision.

Montclair.—Goldie Johnson is supervisor for the elementary grades. The weekly time allotments call for thirty minutes each for the fourth, fifth and sixth years. Twice this is permitted when correlations are made. Field work and garden work are arranged for in the fourth to sixth grades. A nature study course is being organized for the fourth, fifth and sixth grades and in grades one to three work is being done by the classroom teachers who are to be helped as soon as a course of study may be developed.

Nutley.— John Rosengren is high school science supervisor. Forty minutes a week are required in each of the first three grades; eighty minutes from the fourth through the seventh and one hundred for the eighth. Two hundred are required in the ninth grade. Correlation is frequent with geography, history, hygiene and the practical arts.

Phillipsburg.—Lillian M. Houser is elementary school supervisor and George Kane is high school science supervisor. Weekly time requirements call for thirty minutes for the second grade; thirty-five, for the third; sixty each, for the fourth, fifth and sixth, and forty, for the seventh and the eighth. Correlation with drawing and geography is common.

Ridgwood.—Ruth S. Johnston is the elementary science supervisor. Fannie L. Bell is high school science supervisor. Leon A. Payne and Eugene Raffensburger and Ena C. Bothwell are interested science teachers. Correlation is common with geography, history and current events.

Rutherford.—F. J. Carpenter is in charge of high school biology and P. H. Gottshall of physical science. A new course is being planned in which science will be taught in the grades with geography.

South Orange.—The superintendent feels that nature work offers a rare field for such experience as should lead to the development of common sense. Elizabeth Elmer is the nature supervisor.

South River.—William S. Lest is in charge of the elementary school science and Edward I. Weinroth of the high school science. Time allotments call for forty minutes each in grades one and two; sixty, in third, fourth and fifth, and eighty, in the sixth and the seventh and two hundred in the eighth. A printed outline is followed.

NEW MEXICO

The "Course of Study for Common Schools of New Mexico" (1923) indicates that some nature study is taught in the state under the head of "Industrial Education." The outline calls for nature study and agriculture taught in combination, according to season, in the first three grades, the emphasis on agriculture being least in the first grade. In the fourth grade, nature study is correlated with geography. In the fifth and sixth grades, Skilling's, "Nature-study Agriculture" is used as a text.

A new course of study is now being prepared for the state which will be printed about September first, 1930. In this outline, special attention will be given to nature study in the lower grades and to agriculture in the upper grades. At the present time, it is probable that most of the nature study is done in correlation with reading, language, geography and agriculture.

No returns have been received from teacher training institutions nor from city superintendents so that this report is necessarily based on too little material.

The University of New Mexico conducts a field school of biology at Battleship Rock, Jemez Mountain. The courses taught cover field biology, plant and animal taxonomy and ecology. The session in 1930 was held between August 4th and 31st. The director is Edward F. Castetter of the University of New Mexico, Albuquerque, New Mexico.

NEW YORK

So far as the State Department of Education is concerned, nature study or elementary school science is identified particularly with work in humaneness, elementary agriculture and homemaking. A state law makes it possible to withhold the support of public funds from schools not teaching humaneness and humaneness without nature study, obviously is rather limited in its scope, or of the purely sentimental type. A state "Course in Nature Study, Humaneness, Elementary Agriculture and Homemaking" has existed for better than ten years and has been frequently revised and reinterpreted. A committee composed of representatives of the State Department, of the humane education group, the school gardening group and of members of the faculties of Cornell and Columbia Universities has been working on an entirely new outline since 1926. It has formulated a general program which has been submitted to representatives of the normal school staffs and is being submitted to representative teachers throughout the state. The committee in following this procedure is doing all in its power to profit by the long experience of the state in the field of nature and science education. It has refused to be stampeded into getting something into print for that purpose only and hopes that when its outline finally appears it will have made a contribution worthy in every way of the efforts expended. It seems safe to say at this time that the program will be so organized that it may be as useful in the rural school situation as in the urban schools, that there will be no specialization in particular fields of science in the particular grades and that in general given materials may be studied with equal profit in all grades without duplication. It is hoped that the activities will be such as will recognize the value of using previous experience in interpreting present problems and that opportunity will be provided for using local materials which have more or less spontaneous interest. It is possible that the outline may be finished some time in 1931.

From the standpoint of time at least no state of the Union has a richer experience to draw from, than has New York. In 1858, Edward A. Sheldon, then superintendent of schools in Oswego, New York, visited an educational exhibit in Toronto, Canada. What he saw so inspired him that in 1859, the schools of Oswego offered the first course in the United States in the public schools which might be called nature education. The course was called the study of " form, color, size, weight, animals, plants, the human body and moral instruction." The work was so successful that in 1861 the city board asked Sheldon to act as principal of a newly formed training school with a number of the public schools serving as practice schools. This institution later became the Oswego State Normal School. Those interested in this story should read a " History of Nature Study," by Dora Mitchell which is mentioned in the bibliography, in this book. Thirty-five years after Sheldon's visit to Toronto, the Association for Improvement of the Condition of the Poor in New York City, found that many people who could make good livings on the farms were coming to the city and becoming burdens on society. It was recognized that this was an injustice both to society and to the individuals most vitally concerned. To make a long story short, it may be said that the state recognized its responsibility, and the greater possibility of correcting the trouble through the education of children. Authorization for the expenditure of $8000 the first year in extension work of the College of Agriculture at Cornell University resulted, with the stipulation that a part of this be spent in teaching nature study in the rural school. Since that time, financial support has continued and increased. The success of the movement in the state is unquestionably due in part to the type of people early identified with it. Liberty Hyde Bailey and "Uncle John" Spencer shared the burden of pioneering in the field with Anna Botsford Comstock. Bailey wrote "The Nature Study Idea," the philosophy of which has been accepted under other names repeatedly since. Anna Botsford Comstock wrote the "Handbook of Nature Study" and became the recognized dean of American Nature Study. "Uncle John" initiated the publication of material for distribution to the teachers and to the pupils and these progressed through mimeographed sheets to regular periodicals. These appeared under the title of "Junior Naturalists Monthly" and later became "The Cornell Rural School Leaflet." This latter publication is now in its twenty-fourth volume. The practice of distributing printed material to help teachers in service has continued without a break since 1899. With this program, have been identified or developed such nature writers as Julia Ellen Rogers, author of "The Shell Book," Mary Rogers Miller, author of "The Brook Book," Alice G. McCloskey and Edward M. Tuttle, the latter now editor of "The Book of Rural Life," Ada Georgia, author of the "Manual of Weeds." With them at times were associated Edith M. Patch, author of "First Lessons in Nature Study," "Holiday Pond," "Hexapod Stories" and other nature literature. Ann Morgan, author of Putnam's "Fieldbook of Pond Life," was closely associated with those identified with the development of the nature literature which has come through the years from Cornell University. The list might be extended indefinitely to show the influence the institution has had on nature literature from coast to coast. Since 1919, the publication of material for school use and the leadership in nature work has been the responsibility of Dr. E. Laurence Palmer, who has also been closely identified with the professional organizations interested in nature and science education and has served as director of nature education of the American Nature Association, publishers of Nature Magazine. He has also been identified with " The Book of Rural Life," " The Book of Popular Science," " The Classroom Teacher," " The Nature Almanac," " The Fieldbook of Nature Study " and has served as editor of " The Nature and Science Education Review." The printed material for school use coming from Cornell in the form of the Cornell Rural School Leaflet averages about three hundred pages a year and has reached in the neighborhood of 150,000 of the state's rural population in each of the last ten years. The response of rural teachers has been most gratifying as they have seemed to welcome these guides to help them accomplish the aims set forth. The materials used in the last eleven years have been organized on a basis similar to that followed in the School Nature Outline of this book. A cumulative program has been followed since 1919.

The New York State College of Agriculture at Cornell University offers courses in nature study during the regular session and the summer sessions. These courses lead to graduate and bachelor degrees and are essential to certain types of graduate work. For every ten cents spent on nature study by the state through Cornell University, one of 150,000 patrons receives three bulletins totalling one hundred and twenty-four pages. In addition, the teacher of this individual receives twenty pages of printed matter and two minutes of resident instruction while teaching. There is also given on this amount two minutes of instruction to prospective teachers or teachers of teachers. Otis W. Caldwell of Columbia in September, 1929, designated the Cornell leaflet material on nature and science for the elementary schools as " the country's best material in this field." Fannie Dunn, Associate Professor of Education, also of Columbia, speaking of the work says, " I believe that New York has probably done one of the best pieces of work that has been done anywhere, and that the Cornell Rural School Leaflets have been, in my judgment, the best teachers' guides ever published."

The state of New York has also sponsored work in science education at the high school levels. Much of the leaflet material just discussed is written for use at high school levels. The state publishes a course in general science and pamphlets for the purpose of helping teachers of biology and the physical sciences. It also employs a full time supervisor of science, Mr. W. W. Knox, whose activities are concerned with improving science teaching throughout the state. There has been some association between the science program and the agriculture program at all times.

The state has recognized the value of offering its people the opportunity to enjoy the best in nature. It has supported generously a park development program which sets aside considerable areas scattered through the state where there may be some assurance that wild life may be protected indefinitely. Possibly the outstanding example of exposing large numbers of people to raw nature with the hope that nature may not suffer unduly is that at the Palisades Interstate Park where hordes of New York City's population " turn themselves loose on the landscape " every year. The curiosity of these people has been satisfied to a degree by the development of trail museums, nature trails and other automatic nature education devices. Credit for the development of these nature education devices belongs to Major Welch of the Palisades Interstate Park, W. P. Alexander of the Buffalo Society of Natural History and Frank E. Lutz and William Carr of the American Museum of Natural History.

New York State is the home of many institutions of national influence in the field of nature education. The work of the New York Botanical Garden, the Bronx Zoological Garden and many other organizations is treated in detail earlier in this book. The American Museum of Natural History in New York City through its publication *Natural History* has done much to help in the education of the public in general. It has supplied help to such large local organizations as the School Nature League and to the more general Coordinating Council on Nature Activities. It has sponsored expeditions all over the world and established a museum that should be visited by every naturalist who visits the city. The New York

State Museum at Albany has also contributed no small part to the success of nature education in New York. It has published Eaton's " Birds of New York," profusely and splendidly illustrated in color by Louis Agassiz Fuertes. It has also published " The Wild Flowers of New York " which shows in color many of the common native plants of the state. Most of these color plates have been made available to the schools of the state, at times less than the cost of printing. Recently, under the directorship of Dr. C. C. Adams the museum has undertaken the publication of small guides to certain interesting parts of the state. While these are scientifically accurate they are becoming more and more of the type that can be understood by the layman. A splendid new number of this series of booklets deals with paleontology for beginners. The museum at Buffalo has exerted considerable influence outside the city limits and has just established itself in a new home in which every provision is made for the convenience of those interested in learning of nature through the medium of museum offerings. The indoor work has been supplemented by class services which have taken groups of adults and children to interesting sites within reach of Buffalo. The State Conservation Department has issued some useful guides to parts of the state, some of these dealing with foot trails, some with canoe trips and others with automobile routes. These have been valuable to tourists wishing to make the most of trips through the larger park areas of the state.

A number of important schools for learning of nature in the open are to be found in the state. The Allegany School of Field Natural History has been described earlier in this book. Other schools which should be mentioned are the Summer School of Biology at Cornell University which is closely associated with game farms, bird sanctuaries and a naturally prolific terrain for those interested in field studies either in biology or in the earth science. Field courses are also offered for teachers at Cornell and at Teachers College, Columbia. The Columbia offerings include work in biology and the physical sciences and supplement open air trips with museum visits. New York is also the home of the Biological Laboratory of the Long Island Biological Association at Cold Spring Harbor, Long Island. Many important studies have been made at this institution which enjoys an enviable reputation.

We have abundant data from sixteen teacher training institutions in New York State. This may be taken as evidence of considerable interest in this part of the country. The situation at Cornell University has already been touched upon. The university offers more content courses in the biological and physical sciences that would be useful to prospective teachers than any undergraduate could expect to take in a four-year session. In addition, there are sufficient professional courses to fit the prospective teachers to use the content successfully. Elementary school teachers are not ordinarily prepared at the institution but a great number of the graduate students in nature education have shown a special interest in the problems of the elementary field. At Columbia University, the name of M. A. Bigelow stands out as the pioneer. It was he who started the " Nature Study Review " and founded " The American Nature Study Society." He always insisted upon students being adequately founded in the content courses before considering the professional field. Administrative activities have taken Dr. Bigelow away from the field of nature education. His place was taken by Dr. Otis Caldwell, now director of experimental work in education. He has shared his responsibilities in science and nature education with Dr. S. R. Powers whose interests have centered in the secondary field and Dr. Gerald Craig whose interests have centered around the elementary field. Dr. Craig has developed, in Horace Mann School a " Tentative Course of Elementary Science for Horace Mann School " which has received wide recognition through the country. He is at present president of the National Council of Supervisors of Elementary Science. Dr. Craig's outline recognizes groups of specific objectives as parts of large objectives and provides content to develop these objectives. His outlines recognize the merit of both the physical and biological sciences and consider exotic materials earlier in the school experience than is customary in most of the earlier outlines appearing under the nature study title. At New York University, leadership in the field of nature study or science for the elementary levels has been the responsibility of Dr. J. Andrew Drushel. That of the secondary levels has been assumed by Dr. Charles Pieper. In addition, some work in nature education has been carried on under the direction of Prof. Jay Nash in the school designed to prepare leaders in the recreation fields. At the College of the City of New York, according to Dean Paul Klapper, graduates entering the elementary school field have had at least five semester hours dealing with methods of teaching elementary school subjects. It may be assumed that this includes some consideration of science or nature work. Teachers in service who wish to prepare themselves to teach science in the junior high schools are offered two semester hours in the teaching of science, two semester hours in a laboratory course in science teaching materials, four semester hours on subject matter and method of teaching elementary and general science. At the New York Training School for Teachers, Dr. Morris Meister is head of the department of science. The school graduates about five hundred teachers annually who will go into the elementary field, all of whom may be expected to be called upon to teach nature study or elementary science. Some field trips are made, these running up to five per term. The subject matter offered is chosen from the fields of biological and physical science. Dr. Meister has written some splendid supplementary guides for use particularly in the physical sciences. At the Maxwell Training School for Teachers in Brooklyn, Owen T. Batson has been teacher of elementary science. The school graduates about two hundred students yearly into the elementary field all of whom may be expected to teach science or nature study. The offerings include consideration of biological and physical science with rather less emphasis on studying the biological materials in their natural setting than is the case with most other reports. Agriculture, commerce and industry provide cores for the science materials. About ten field trips a term are made. At the University of Buffalo, there is no elementary teacher training in the field of nature study and science according to C. H. Thurber. At the Syracuse City Normal School, Mary A. Joslin is the instructor in charge of teaching science to prospective elementary teachers. The institution offers required courses in content and method in elementary science or nature study and in the earth sciences. The content of the nature study seems to be almost exclusively biological and the human activities touched are concerned essentially with agriculture and forestry. At the Rochester City Normal School, four hours of natural science are offered in the first year. Health education is given three hours in the second year and nothing associated with science education in the third. The kindergarten group gets a course in geography methods. Elsie M. Yawger is responsible for the science course which is a theory and method course. Rochester is only beginning to try teaching science in the first three grades on a tentative basis in a few schools of the city.

The state normals in New York State have been on a three year basis since 1922. Until the fall of 1929, a three hour course in nature study was the only science required. A three-hour course in general science looking towards teaching that course in the junior high school was an elective offered in several normal schools, however. In September, 1929, a new course of study went into effect which requires educational biology, two hours, in the first semester of the freshman year and elementary science, three hours, the second semester. The outlines of these courses have been drawn up by two committees of teachers appointed for that service by Guy Bailey of Geneseo Normal School, who is chairman of the normal school science teachers of the state. He has worked on both committees himself. Professor Bowers of the Cortland Normal is chairman of the educational biology committee and Jessie J. McNall of Potsdam Normal is chairman of the elementary science committee. With her is associated Professor Tether of the Oswego Normal. Besides the required courses outlined by these committees, Potsdam and Geneseo offer one or more additional courses for those who are preparing to teach junior high school science. The need for more thorough preparation of teachers in the field of science is genuinely felt. Since the offerings of the normal schools and teachers colleges run by the state are essentially the same in science we will merely list here the names of the teachers who have cooperated in supplying the data for this report. Geneseo Normal School, Guy Bailey is responsible for the science for the higher grades and Robert A. Greene for the work in the elementary school grades. Potsdam Normal School, Jessie McNall is head of the science department and Alita Williams is the assistant. Brockport, Sara Jackson is the teacher of elementary science. Buffalo State Teachers College, Charles A. Vail has responsibility for the higher grade courses and Professor Fretz for the lower grade work. At the Albany State Teachers College, training is done for the high school levels only. Among those responsible for the training there are Dr. Gertrude Douglas, Victor Baden, Professor Power, Mr. Moose and the Misses Rowlet and Betz. At Oswego

Normal, Chester Tether is the head of the science department. At Cortland Normal, R. A. Bowers and Mr. Hillegas teach the science work. At Oneonta Normal, R. A. Johnson is responsible for science teaching and at New Palz Normal, Gertrude Nichols is head of the science department.

We have reports from nine New York cities in which nature work is allowed but not required. These include Dunkirk and Fredonia, where Milton B. Schafer is garden supervisor; Hamburg, where Anne Mae Bacon is teacher of elementary science in the eighth and of biology in the ninth, but where it is difficult to secure a teacher for nature study; Haverstraw, where a printed outline is followed but the schedule is too crowded to permit the best work being done; Hornell, where T. J. Ahern is in charge of high school science; Ithaca, where Mary Reidy is in charge of high school science; Medina, where Ermie M. Boardman is a leading nature teacher; Patchogue, where Helen Craig teaches the high school science; Pelham, where J. C. Brown is the leading science teacher and where nature work is not being taught in the grades but where it is to be strengthened in the future; Saratoga Springs, where Richard Leonard is in charge of high school science but a crowded schedule interferes with strong elementary school work and Spring Valley, where Leland R. Meyer is in charge of high school science. In all the reports from New York communities mentioning obstacles to successful elementary school nature study, the two reasons most frequently given are inadequately trained teachers and too crowded schedules. The reports from other communities follow:

Bronxville.—Anna M. Greve is in charge of the elementary school science and Earl Goudy of the secondary school science. Correlation with English is common and time allotments follow: Twenty minutes each in the first and second grades; thirty minutes, the third; and seventy each, in the fourth to sixth inclusive.

Babylon.—C. W. Armstrong is in the charge of science in the elementary schools. Time allotments follow: Forty minutes each, in the first and second; fifty each, in the third and fourth; sixty each, in the fifth and sixth. A printed outline is followed.

Batavia.—Florence Quick is in charge of elementary school science and Charles F. Keegan of the secondary science. Time allotments follow: Thirty minutes each, in the first to third grades and forty-five each, in the fourth to sixth inclusive. Correlation is with English.

Canandaigua.—Hazel Wolverton is in charge of elementary school science and George Russell of the secondary school science. Correlation is with reading and geography, but it is difficult to secure enough interested teachers. The time allotments call for forty minutes each in the first three grades; sixty each, in the fourth to sixth; two hundred and seventy-five, in the eighth; and three hundred, in the ninth.

Clyde.—E. O. Lansing is responsible for science throughout the school system. Time allotments provide eighty minutes each in the first eight grades and three hundred and twenty in the ninth. Correlation is with English.

Elmira Heights.—B. H. Lee is in charge of elementary school science and Grayden E. Monroe of the secondary school science. Time allotments call for thirty minutes each, in the first three grades; forty minutes each, in the fourth to sixth; sixty each, in the seventh and eighth and three hundred, in the ninth. Correlation with geography and reading is common though a crowded curriculum makes successful nature and science work difficult.

Granville.—Margaret Murphy is in charge of elementary school science and Mabel Richardson of high school science. Time allotments call for forty minutes each, in the first five grades and sixty each in the next three.

Jamestown.—Elizabeth Merrill and Katherine Goodman are the grade supervisors responsible for elementary school nature and Harry W. Kline has charge of secondary school science. Time allotments call for fifteen minutes in the first grade; twenty each, in the second and third; thirty each in the fourth to sixth; fifty-five, in the seventh; two hundred and twenty, in the eighth and two hundred and seventy-five, in the ninth.

Johnson City.—Edith Carpenter is in charge of high school science. Correlation with reading and English is common in a schedule with these time allotments. Twenty minutes each, in the first two grades; twenty-five in the third; thirty each, in the fourth and fifth; forty, in the sixth; sixty each, in the seventh and eighth and two hundred and fifty, in the ninth.

Johnstown.—E. L. Ackley is responsible for elementary school science and W. A. Wright for the high school science. Fifteen minutes each, in the first six grades satisfy the time allotment.

Mohawk.—Ann G. Barnes is responsible for elementary school science and Mrs. Mildred Hilyard for secondary school science. Time allotments call for twenty minutes each, in the second to fourth grades; thirty each, in the fifth and sixth; forty-five each, in the seventh and eighth and two hundred and twenty-five, in the ninth.

New Rochelle.—Katherine E. Dolbear is elementary science supervisor. Work is closely correlated with health education, art and arithmetic. It has been found difficult to secure adequately trained teachers. The time allotment calls for forty minutes each, in the third to sixth grades; eighty-five each, in the seventh and eighth and two hundred and twenty, in the ninth.

New York City.—Dr. Van Evrie Kilpatrick is school garden supervisor. A survey published in late 1929 showed that of five hundred and eighty-seven schools over half had plants growing in their school rooms. One hundred and nine, well distributed through the city, reported special nature rooms in their buildings. In addition to the School Nature League rooms, eighty-four schools mostly junior high schools reported departmental nature rooms and one hundred and sixty-one schools reported one thousand four hundred and ninety class nature rooms where the individual teachers have used portions of their rooms for nature work. In October, 1927, the Board of Superintendents published a "Course of Study in Nature Study for Elementary Schools, Grades 1A to 6B." This prints sixty-four pages.

George Dorland was chairman of the committee preparing the syllabus. The outline is suggestive and seasonal. It outlines activities briefly and covers the various fields of biological and physical science to some extent each year. It replaces a similar outline published in 1920. The teachers of high school science have active organizations in which their problems of teaching are worked out. Some of their activities have been published.

Oneida.—Mark L. Dalton is responsible for high school science. The time allotment is ninety minutes for the eighth grade and two hundred and twenty-five, for the ninth.

Oswego.—Mildred A. Bell is responsible for elementary and secondary school science. The time allotment calls for forty-five minutes each, in the seventh and eighth grades, and two hundred and twenty, in the ninth.

Penn Yan.—The time allotment follows: Fifteen minutes each, in the first and second grades; thirty each, in the third to sixth and ninety each, in the seventh and eighth. Correlation is common with geography and health work.

Port Jervis.—A. E. Chase is responsible for high school science. The time allotments call for thirty minutes each, in the first six grades; ninety, in the seventh; and forty each, in the eighth and ninth.

Rochester.—Harry A. Carpenter is specialist in science for the schools of the city. The time allotment calls for sixty minutes a week in each of the first six grades; one hundred twenty each, in the seventh and eighth and two hundred and forty, in the ninth. There is definite correlation and a new outline is in course of preparation.

Rye.—Helen B. Gere is in charge of elementary school science. The work has just started since 1929. There is some correlation with art. The time allotment calls for forty minutes each in the first four grades; twenty-five each, in the fifth and sixth; and thirty each, in the seventh and eighth.

Scotia.—High school science is the responsibility of Wetah Smith. The elementary school work is in charge of B. W. Conrad. There is no correlation and the time allotment is as follows: Twenty minutes for the first grade; forty each, for the second to sixth; one hundred, for the seventh; one hundred fifty, for the eighth and two hundred and fifty, for the ninth.

Whitehall.—High school science is the responsibility of B. P. Murphy. Time allotment calls for thirty minutes each, in the first two grades; sixty each, in the third to eighth and two hundred and twenty-five, in the ninth.

NORTH CAROLINA

Nature study is an elective subject in the elementary schools of North Carolina. The state is now engaged in preparing a new course of study for the elementary schools. Nature study or elementary science is one of the subjects to be given consideration. No formal textbooks are required. As nature study is represented in the existing course of study it is essentially introductory to geography. It is recognized as nature study for the first two grades, and then the material outlined for the third grade as " Home Geography and the Earth as a Whole " might easily be and frequently is, classed as nature study. The suggested time allotment for one-teacher schools makes provision for twenty-five minutes a day in which the school is handled as a whole in " Hygiene and Agriculture of Nature Study," this being in addition to the time allotted to geography. According to this plan, the grades are grouped into four sections, the first being the first grade or beginner's group, the second being made of the second and third grades. The third is composed of the fourth and fifth grades and the fourth of the sixth and seventh grades. The method suggested under the geography-nature study for the first two grades is slightly different from the generally accepted method of nature study. The outline says, " The method should consist largely of oral work based upon observations made in daily life. This should be supplemented by stories and picture studies of children of other lands and other times with special reference to primitive people. The use of a sand table may be most helpful in these grades. During the second year, the work should be developed in a way to emphasize comparisons in resources, occupations and habits of the children, and their home people, with people of other communities and other lands." There are leaders who will contend that such a program includes a minimum of nature study and a maximum of geography.

Duke University offers a course by Miss Sullivan on primary geography and nature study in which " some acquaintance with the out-of-doors, common birds, butterflies, insects, animals, trees, flowers, etc., is given with methods of teaching about the materials. A course in biology and field botany is also offered which should help prospective nature teachers. The field botany course is given at Lake Junaluska. Information concerning it may be secured from H. L. Blomquist at Durham, North Carolina. A course in geographical nature study is also offered by Mrs. Goldson at the Junaluska summer school of Duke University.

Furman University has held biological summer camps at various places. One has been held at Burgess Glen, Cedar Mountain, North Carolina. Courses are offered to high school graduates and to others interested in the offerings. S. A. Ives is the director. The camp for 1930 was held between July 21st and August 23rd. One of the most famous biological stations in the state is the Fisheries Biological

Station at Beaufort founded for the purposes of research by the United States Bureau of Fisheries. This station is open throughout the year to qualified research students.

At the East Carolina State Teachers College at Greenville, North Carolina, Alice V. Wilson is in charge of the nature work. The regular normal students are required to take a course in nature study, one in earth science and one in hygiene and sanitation. The course in nature study concerns largely biological materials studied in the field. Woods and fields crowd close to the college buildings. Students in the four-year course are required to take the same courses taken by the normal students and in addition nine credits in general science. At the Asheville Normal School, Ethel B. Finster is the teacher of biology. The school graduates fifty students a year into the elementary field, about three-fourths of whom will be called upon to teach science or nature study. The nature study course is elective though there are required courses in biology, hygiene and chemistry. The nature study course is offered in 1930 for the first time during the regular school year.

Returns from North Carolina communities are few and disappointing. They follow:

Greensboro.—Mrs. W. V. Blackburn is in charge of high school science. There is no outline and no required time for elementary school science.

Winston-Salem.—R. H. Haltewanger is in charge of high school science. The only time requirement is for three hundred and twenty-five minutes, in the ninth grade. Some little garden work is done in a few eighth and ninth grades.

NORTH DAKOTA

In the previous edition of the *Almanac,* it was reported that, at that time, nature study had no place in the training departments of North Dakota's training schools. This year we have to report work being done in at least two state teacher-training institutions. This bears out the prediction made in the previous edition that "in the near future nature study" would be given a "definite period" in the program. At the State Teachers College at Valley City, Vida A. Austin is the head of the biology department and is responsible for the general nature work. She reports nature study as a required course offering principally content in the first year of training. A course in health and hygiene is also required. The content is divided about equally between the field of physical and biological science and first-hand studies are made under natural conditions so far as possible. At the State Normal and Industrial School at Ellendale, William Jackson is responsible for the work in nature education. Agriculture and nature work are so closely associated that it is difficult to recognize where one begins and the other ends at this institution. A four-hour course in agriculture is required but it is largely nature work. There are also required courses in biology, health and sanitation and other courses required for specific curricula. The course in agricultural nature study is largely biological.

The North Dakota towns reporting this year follow:

Mandan.—E. H. Schroeder is high school science supervisor. The work in the lower grades is correlated with geography.

Valley City.—G. W. Hanna is responsible for high school science. There is no time requirement though twenty-five minutes a week is suggested for each grade.

OHIO

Ohio's State Department of Education has recognized science as a school activity in grades seven and eight since about 1912. It gives no particular official recognition of it below that level at the present time. It supplies no state-wide supervision of science activities and sets no state requirements relative to the teaching of science or nature work below the ninth grade. One unit of science is required for high school graduation. It recommends two hundred minutes per week for the first grade and two hundred eighty each, for the second to fourth grade and two hundred, for the fifth. The science sequence recommended for the high school calls for general science in the ninth grade, biology in the tenth and physics or chemistry in the eleventh or twelfth. It publishes no state outlines in these subjects and there are no state adopted text books.

At the State University of Ohio in the School of Education Professor O. G. Brim writes that there is a three-hour course in elementary science designed to help in the elementary field. Ten hours of work in biology are required of prospective elementary school teachers but this has not as yet been specifically organized to meet the needs of elementary teachers. Special teachers of science for work at the elementary level are not prepared at the institution. The authorities, however, believe thoroughly in the activity curriculum and the laboratory type of school. This means that the child's experience is made basic to any school work and because of this much use is made of nature study materials. It is possible that more use is made of such materials than is the case in many schools where more time is given specifically to the teaching of elementary science or nature study as such. The name of Professor Twiss is of course associated with Ohio by all those interested in science education and its literature.

At the University of Cincinnati a course definitely known as nature study and gardening has been offered for the last few years. Dr. H. M. Benedict and Mrs. L. M. Burtis have been chiefly identified with this work at Cincinnati. At the Western Reserve University, considerable recognition has been given to nature and science education. There we find, particularly, Dr. W. G. Vinal in charge of nature guiding and science teaching as it is associated with it's biological phases and Ellis Persing in charge of the teaching of general science with emphasis on the physical science side. Each man has made a worthy contribution in his chosen field. Vinal is the author of " Nature Guiding " and founder of The Nature Lore School and The Nature Guiding School. Persing is the author of numerous magazine articles and co-author of the Persing-Peeples readers. The gardening phase of nature education in Cleveland is cared for by the supervision given by Paul Young. Twenty-three teachers are doing special garden work, some of the itinerant type. Three elementary and junior high schools are doing greenhouse work. There seems to be an increased interest among the teachers in nature work and one hundred twenty teachers in service are taking special work in elementary science. Many are doing full-time work under the platoon system. Other schools such as the Doan School have all the teachers teaching science in their home room. The Doan school has nature and science work as its major interest and is developed in part as an experimental project, other schools in the city majoring in other fields but all satisfying minimal standard requirements. The activities at Western Reserve are greatly enriched through cooperation with the Cleveland Museum of Natural History, through the splendid park system of the city and through cooperation with the science departments of the University not in the School of Education. The account of the Nature Guiding School on page 142 should be read in connection with this note on Western Reserve University. Superintendents interested in a developing nature program for a city school system should get acquainted with the work being done by Vinal and Persing.

At Miami University, Antoinette Press, instructor in biology, has been responsible for a required course in nature study and elementary science. The course is largely one of content and is concerned essentially with the biological field. An average of between one hundred twenty and thirty students a year complete the course.

Kent State College, formerly Kent State Teachers College offers work designed to help prospective teachers in the field of science and nature education. Harry Cunningham is head of the biological science department and has placed considerable emphasis on the courses more generally recognized as pure science. The courses designed to help elementary teachers in science or nature teaching have been taught by Ethel Gowans and S. A. Harbourt. In the practice school, the work is supervised by Susanne M. Koehler. The nature study course is a four-hour unit and is one of thirty-three courses listed in the catalogue for teaching by a staff of three members. Not all the courses are offered each year, of course. Many of the courses are of the professionalized subject matter type but few are offered in any one year. Of the thirty-three courses announced fifteen were not given in 1929-30. It is estimated by S. A. Harbourt that of the three hundred graduates of the college each year two hundred will find themselves upon graduation called upon to teach nature study or elementary science in the grades. A year course in the subject matter of general science is offered to candidates in the four-year course in elementary education. This is administered through the physical science department and is taught by A. W. Stewart.

At Bowling Green State Normal College, E. L. Moseley is in charge of the nature education work. He is well known because of his books some of which are listed in the bibliography of this book. The students at the institution taking the two-year course take nature study or agriculture most of them taking the former. The four-year students many of whom do not expect to teach in the elementary field take four hours of zoology and four hours of botany. Many elect chemistry and some take physics. Much field work is done in the classes in nature study by Professor Moseley.

At Warren City Normal, Gertrude Bartlett is principal. She reports that there is a required course in nature study and elementary science and another required course in health and sanitation.

Ohio State University sponsors the Franz Theodore Stone Biological Laboratory at Gibraltar Island near Put-in-Bay, Ohio. This is a field laboratory designed essentially for research in aquatic biology.

We have the following reports from Ohio communities relative to their activities in nature and science education:

Barberton.—H. A. Pieffer is in charge of high school science. It seems difficult in the elementary grade levels to keep nature work away from text-book work. Possibly this is because of close correlation with geography which must in part be text book work. The time allotment follows: Seventy-five minutes each, in the first three grades; one hundred twenty-five, in the fourth; two hundred each, in the fifth to eighth and three hundred, in the ninth.

Cleveland.—The report of Western Reserve University just given has a bearing on this situation. There is no time requirement ordinarily but thirty minutes a week may be given to nature and science work in each of the first six grades according to H. M. Buckley, assistant superintendent of schools. Some interesting and useful courses in nature study have been issued by the Diocesan School Board of Cleveland. These are designed for use in the fourth, fifth and sixth grades. They have also prepared some highly acceptable tests in science.

Columbus.—J. C. Hambleton is responsible for nature and science work in the elementary schools. The time allotment calls for seventy-five minutes each, in the first two grades; sixty each, in the third and fourth; and thirty each, in the fifth and sixth. The work is correlated with art, English and geography. In addition to this time requirement, each elementary school sends to the Ohio State Museum from three to five classes per semester for an hour and a half class in natural history. A special teacher is located at the museum to take care of this situation.

East Palestine.—C. E. Palmer is responsible for science and nature work in the elementary schools and P. R. Lamb for that in secondary levels. No time is required for the work below the seventh grades though an hour or better is permitted in each grade. The time allotment for the seventh and eighth grades is two hundred minutes each and for the ninth, two hundred and twenty minutes. Correlation is made with geography.

Findlay.—Correlation is common with reading and geography. The time allotment calls for forty minutes in the second grade; fifty each, in the third to sixth and three hundred each, in the seventh to ninth inclusive.

Greenfield.—Helen Ellis is responsible for science in the first two grades; Merle Ellis, for the third and fourth; Helen Harris, for the fifth and sixth, and B. R. Duckworth, for the seventh to twelfth. The time allotment calls for thirty minutes each in the first three grades; forty-five each, in the fourth to sixth and sixty each in the seventh to ninth. Correlation is common with geography and health work.

Kent.—J. W. Shangler is responsible for high school science. The time allotment calls for fifty minutes each in the first six grades; ninety each, in the seventh and eighth and three hundred, in the ninth.

Lakewood.—Grace Daugherty is responsible for elementary school science and nature study and Mr. Collier for that in the high school. Time allotments call for twenty-five minutes each in the first three grades; forty-five each, in the fourth to sixth and one hundred and fifty, in the eighth. Correlation is common with geography and much help has been secured from the Cleveland Museum of Natural History. The Horace Mann course of study is followed.

Miamisburg.—William R. Piper and Harriet Kimmel are in charge of high school science. A typewritten course to be printed soon is followed in the elementary grades, but no time requirements are made. Field trips are arranged for all grades. Correlation with geography is general.

Napoleon.—C. E. Roberts is in charge of elementary school science or nature work and C. D. Brilliart of that of high school levels. There is no correlation work in the first six grades. The time allotment calls for fifty minutes each, in the first four grades; seventy each, in the fifth and sixth; two hundred each, in the seventh and eighth and two hundred twenty, in the ninth.

New Lexington.—C. E. Oakley is responsible for the elementary school science. There is no time allotment required but approximately an hour's work is permitted in each of the first eight grades.

Toledo.—M. R. Van Cleve has been until the fall of 1930 the director of nature study of Toledo. He has developed a thoroughly organized course of study in which thirty minutes a week are required in each of the first six grades. Correlation on additional time has been made with reading, art, geography, language and manual training. Mr. Van Cleve has been convinced of the necessity of special nature rooms and equipment with specially trained teachers if successful nature work is to be expected. His outline includes gardening activities and aims at certain skills, habits, and appreciations. The first two grades might be conveniently grouped with kindergarten suggestions. In the third and fourth grades, plant and weather experiences are provided with water life also emphasized. In the fifth grade, gardening, street trees, reptiles, and amphibians are given prominence. Birds have been studied in the previous grades but those that migrate are given particular attention in the fifth. In the sixth grade, birds of great economic value are considered with forest trees and forest problems, landscaping and gardening and insects injurious to gardens. Methods of controlling the lives of all these things are stressed in the sixth grades. It is to be regretted that Mr. Van Cleve feels called upon to discontinue to identify himself so prominently with nature and science education as he has in the past. The schools of Toledo which have developed unusual interest in nature and science work include the Fulton School, Monroe School and LaGrange School.

Willard.—C. I. Landis is responsible for elementary school science and E. H. Seidel, for secondary school science. The work is correlated with geography with a time allotment as follows: Forty minutes each, in the first two grades; fifty each, in the third and fourth; sixty each, in the fifth and sixth; one hundred eighty, in the seventh, and three hundred each, in the eighth and ninth.

OKLAHOMA

We lack evidence that Oklahoma has a thoroughly developed state program in nature study or elementary science. Such a program is being developed, however. There are a number of localities in the state where the work is well organized and a considerable number of individuals in the state who have shown leadership ability in the field of nature education. In general, work in nature study in the state is included under biology and a great deal of correlation is suggested both at high school and elementary school levels. Cliff R. Otto of the department of chemistry and biology of the Central Oklahoma State Teachers College has recognized an obligation to make the offerings of his institution in science meet the needs of elementary teachers. The school graduates annually some three hundred students, approximately a third of whom will find themselves called upon to teach nature study or science in the elementary school levels. The institution offers fundamental courses in botany, zoology, physiology, bacteriology, physics, chemistry, photography and health. In general, the courses are concerned more with content than with method. Comparatively little field work seems to be done, the living organisms being studied for the most part alive in the class room. The general themes kept in mind in selecting materials involve consideration of conservation, health, life history, physiological, ecological and commercial relationships, food values and seasonal studies. Little consideration is given to forestry and the marine industry naturally but much is given to agriculture, industry and commerce and mining. The science work in the practice school of Central State Teachers College is cared for by J. T. Butcher. At the Southeastern State Teachers College, Walter L. Blain is responsible for the elementary school science work and for the work in biology. About one-quarter of the school's graduates will probably be called upon to teach science in the elementary schools. It would seem from the returns from these two institutions that Oklahoma communities generally are not likely to ask that their teachers present this phase of education. On the basis of the reports at hand, there seems to be little difference in the offerings of the two institutions though there seems a greater tendency to stress field work at the Southeastern College than at the other. The average number of semester hours in science and science methods required of prospective teachers at these schools apparently is as follows: kindergarten, seven; rural, seven; elementary grades, nine. In each institution, it would seem that there is adequate physical equipment and a suitable natural environment to do entirely acceptable work.

The returns which we have from local communities in Oklahoma follow:

Ardmore.—The lack of a well prepared course of study is felt at Ardmore. Nature work in the elementary schools is supervised by J. J. Godbey. The work is correlated with geography, health and physical education. The weekly time allotment is as follows: First and second grades, sixty minutes each; third to sixth, ninety each; seventh and eighth, one hundred fifty each and ninth, one hundred eighty minutes. Superintendent Godbey is chairman of a committee appointed by the State Superintendent to formulate courses of study in elementary science, health and physical education. It is hoped that these subjects may be fused into one in the elementary grades with profit to all.

Guthrie.—There is no time requirement for science below the seventh grade and no special supervision of the subject. At the high school levels, Esther Redmond is in charge of science work and the time allotments call for ninety minutes each in the seventh and eighth grades and three hundred in the ninth. Correlations in the lower grades are suggested with geography and health work.

Holdenville.—The weekly time allotments call for one hundred minutes each in the first five grades; one hundred fifty, in the sixth and two hundred and twenty-five each in the seventh, eighth and ninth. A printed outline is followed in which there is correlation with art and with hygiene. There seems to be some difficulty in administering schedules which will be suitable to the teachers. Anna Porter is responsible for the high school science.

Mangum.—W. J. Pointer is responsible for elementary school nature work and H. S. Reese for that at the high school levels.

Miami.—Clyde H. O'Dell is responsible for elementary school nature work and Zoe Blackburn and Alice Berkshire for that at high school levels. The weekly time allotment for the work follows: First grade, fifty minutes; second to fourth, seventy-five each; fifth and sixth, one hundred each; seventh and eighth, two hundred each and ninth, three hundred. A mimeographed outline is followed in which correlations are made with geography, health and agriculture.

Muskogee.—Mrs. Maegeane Rice is responsible for elementary school nature work and M. C. Watson for that at the high school levels.

Newkirk.—Helen Pray is responsible for high school science work. No definite outline is followed and there is no correlation with other subjects.

Wagoner.—Mrs. Rose Blake is responsible for elementary school science and John D. Fonburg for the high school science. No definite outline is followed and the only time allotment is that three hundred and fifteen minutes may be elected for the work in the ninth grade. Correlation with the work is common with English and with reading but ample systematic correlations do not seem yet to be the practice.

OREGON

According to a letter from the State Department of Education of Oregon no changes in the recognition of nature work have been made since the appearance of the last issue of the Almanac. In the earlier issue, it was reported that practically nothing was being done in nature education in the state.

While we had no reports from Oregon normal schools three years ago we now have one from the normal at Monmouth where Homer Dodds is the head of the natural science department. He reports that the institution graduates about four hundred sixty-five students a year only about two per cent of whom will be called upon to teach or supervise nature study or elementary science. There are four members of the school faculty engaged in teaching science to prospective elementary school teachers. According to Dr. Dodds' report, much of the work is taught without the use of materials in their natural setting and the work in physical sciences is handled to a considerable extent without the use or demonstration of real materials. In planning the courses in science, applications to forestry, agriculture and industry are kept in mind. Kindergarten teachers graduating from the institution take, on the average, four hours in science. Rural teachers take three hours of agriculture and elementary grade teachers take two of science.

The writings of Mr. and Mrs. William Finley have indicated frequently that the state of Oregon needs more work in nature education particularly because of the treatment of the Klamath basin where breeding grounds for large numbers of water birds were destroyed by draining territory which was unsuitable for agricultural purposes. Had the state been conscious of the value of this unique area it seems doubtful that the unwarranted changes would have been made in the Klamath basin. Oregon with its scenery and natural wealth has been the mecca of many nature-minded people. It seems unfortunate that it has not gone farther in the direction of sane nature education than appears to be the case from our returns.

It is encouraging that our records this year are much more satisfactory than they were when the first issue of the Almanac appeared. Our returns from local communities follow:

Bend.—Elsie Thorsteinson and G. W. Ager are responsible for the nature and science work of the first six grades and Max Bowersox of the work at the secondary school level. The time allotments are generous, as follows: Second to fourth grades, one hundred and thirty-five minutes each; fifth through the eighth, ninety minutes each. The work of the second and third grades is grouped together and correlations in the general program are made with geography and hygiene where this is appropriate.

Corvallis.—At the Agricultural College, Frank Sipe of the botany department has for some time shown a genuine interest in the cause of nature education. In the city schools, there are no special science teachers in the elementary schools but there are real time allotments as follows: Second and third grades, one hundred minutes weekly, each; fourth to eighth, one hundred twenty minutes each; and eighth grade, three hundred minutes. Correlation is made where suitable with history, English, spelling and penmanship.

Grant's Pass.—J. F. Swigart is head of the high school science department. The weekly time allotments follow: First and second grades, thirty minutes; third to fifth, forty minutes each; sixth to eighth, sixty minutes each. Correlation is made with language.

Newberg.—H. D. Oldham is responsible for elementary school science or nature work and W. C. Leth for that at the high school levels. The weekly time allotments follow: First and second grades, sixty minutes each; third to sixth, ninety each and ninth, two hundred and fifty minutes.

Pendleton.—J. Stanley Brode is in charge of the high school science. His family has shown considerable success in science teaching and his father is a member of the faculty of Whitman College in Washington. J. S. Brode has written and published a number of papers dealing with high school nature or science education which show a desire and ability on his part to teach from and of the biological materials near at hand. His papers have been presented at the state teachers meetings and published by the state school of education. Mr. Brode's interest seems to center around limnology to a considerable extent.

The Dalles.—J. A. Wells is responsible for high school science at The Dalles. A mimeographed outline is used in the city in which the following time allotments are recognized: Third to sixth grades, one hundred minutes each; ninth grade, three hundred minutes.

PENNSYLVANIA

Pennsylvania professes to have recognized science in its public schools since the establishment of the Philadelphia Academy in 1751. In the earlier days, this obviously was more of a secondary nature and not until the late eighties did science win a recognized place in the programs of grades nine to twelve. Not until ten years later did it have a place in the lower grades which was recognized by the

State Department of Education. It was in the nineties that Jackman played so important a part in using science in the elementary grades of Pittsburgh that he attracted attention outside the state and was called to Cook County, Illinois Normal School later to become head of the School of Education of the University of Chicago. Jackman's success in Pittsburgh did much to ease the tasks of those who followed him in that city and it is not surprising that the city has long been a stronghold of nature education. The University of Pittsburgh, Pennsylvania State College and the state teachers colleges have been instrumental in fostering the work through the state largely through the training given the teachers who graduated from the institutions. The state provides supervision by a director of elementary education and assistant directors of secondary education. This supervision consists largely of school visitation, attendance and help at teachers' meetings, supervision of teachers' guides, the preparation of these guides and supervision concerned with credentials. At present, the science requirements for teachers entering the various services call for the following number of hours: rural teachers, eleven semester hours; kindergarten teachers, nine hours; primary teachers, nine hours; grammar school teachers, eleven hours; junior high school teachers, thirty-three hours and senior high school teachers, thirty-three hours.

The organization of the schools of Pennsylvania like that of most other states is at present undergoing considerable change. It seems that the new program being outlined will meet a six-year elementary organization for those schools with a modern type of organization. For the rural schools and some of the urban schools which still maintain an eight-year organization, a special adaptation will be prepared. There will also probably be definite courses outlined for the junior high school and for the senior high school. The major objective back of all this will be to give a full twelve-year sequential provision for science instruction in the public schools of the Commonwealth. Sufficient progress has not been made in the new organization of science as a whole in the schools to make public what the final picture may be. The state outline in science for the first six grades is being prepared under the direction of Helen Purcell, Director of Elementary Education. According to the present "Manual and Courses of Study for Elementary Schools" issued as Bulletin 17 of the State Department of Public Instruction, the function of science in the elementary schools is " to multiply children's experiences with the objects and forces of nature to be met in everyday life, thereby directing into purposeful channels the primary instincts to explore, collect, nurture, know and construct. The special function in the high school science work is to help the pupil organize the facts and forces of his material world in logical fashion, so that he may adapt his living and thinking with increasing effectiveness to the social, physical and economical life about him. The proposed program will deal with the present and probable future life-problems of the pupils so as to bring the scientific habit and attitude of mind to bear increasingly upon the problems and situations of everyday life." The proposed program will probably recognize the following specialization: nature study, grades one to three; nature study including gardening, grades four to six; general science including elementary agriculture, grades seven to nine; general biology, grade ten (in the larger cities there will probably be allowance for a full year of botany and a full year of zoology), and physics, chemistry or physiography, grades eleven to twelve. The state law requires that humane education be taught up to and including the fourth grade.

In a special " handbook of organization for a course of study in one-teacher elementary schools," the time allotment suggestions are essentially as follows: first grade, fifty minutes per week; second and third, seventy-five each; fourth, one hundred; fifth and sixth, one hundred twenty-five each and seventh and eighth, one hundred eighty each. This is organized on a basic plan that all of the time for the first two years shall be given to nature study, that all of the second half of the eighth year shall be given to science, and that in the remaining years the time may be assigned to geography, nature study or science as local conditions demand. The suggested subject matter is, roughly as follows: first and second years, essentially plant study; third and fourth grades, essentially bird and mammal study; fifth and sixth years, essentially gardening of various types; seventh and eighth grades, largely agriculture and forestry. This last course includes most of the topics ordinarily treated as general science.

In the suggested program of studies for six-year junior and senior high school the following numbers of periods per week are recommended in the sciences in the various years: seventh year, geography and science, five periods; eighth year, geography and science, three periods and required health education, three periods; ninth year, general science, four periods, health, two; tenth year, biology, five to six periods, health, three and elective geography, four to five; eleventh year, health, three and elective physics, five to six; twelfth year, health, three and elective chemistry, five to six.

At Pennsylvania State College the work in nature study is in the School of Education as a responsibility of Professor George R. Green. The work has been organized to satisfy two distinct needs, those of resident students and those of teachers in service. Unlike the extension service in New York State which emphasizes extension through publication of a periodical as well as through visitation at teachers' meetings, Pennsylvania State has built up a system whereby members of its faculty visit communities away from the college a sufficient number of times to warrant the granting of credit to those teachers availing themselves of the work offered. Service of this sort has been established in Philadelphia, Scranton, Reading, Pittsburgh, Johnstown and other cities of the state. In connection with the summer session, a camp has been established where students may get nature experiences different from those on a college campus. The camp session was organized in 1930 in two units, one extending through the three weeks from June 26th to July 16th and the other through the succeeding three weeks period. A regular teaching staff of six members is with the camp during the two sessions and three special lecturers are also scheduled. The college, through its department of nature education has outlined a program in nature education leading to a B. S. degree. Of the one hundred and thirty credits required, twenty-nine are in the department of nature education.

The University of Pittsburgh conducts a summer biological laboratory at the Pennsylvania Fish Hatchery at Erie, Pennsylvania. Here graduate and undergraduate courses in botany, zoology and geology may be followed under the leadership of Drs. Jennings and Williams and Professor Leighton of the University of Pittsburgh faculty.

Further opportunity for securing training in field natural history is presented by a course offered by the Nature Study Club of Pittsburgh at their summer camp at Na-wak-wa Lodge, Ligonier, Pennsylvania. Satisfactory completion of the course may carry with it from four to six hours of credit in the University of Pittsburgh.

Nature study in the Pennsylvania teachers colleges is generally well established. In the report of the General Curricular Revision Committee relative to the science offerings in the normal schools, it was recommended that nature study be given on the basis of two hours a week through the year and that it shall " include all phases of elementary science in the elementary school, except those phases that are particularly included in geography and health courses. This course is designed to give to the prospective elementary school teacher an acquaintance with, and a sense of how to use educationally, the natural materials that are a part of the environment of every child. Field trips, laboratory study, lectures, readings, collections of materials, lists of materials seasonably suitable and by grades; these words and phrases indicate the general direction and spirit of the course." The above described course appears as required for those taking courses known as the two-year kindergarten and primary grades, one, two and three; the two-year intermediate grade; the two-year rural and the four-year elementary education course for classroom teachers. Nature study appears in the training school work of most of the normal schools. We have returns from eight of the state teachers colleges indicating the type of work being done. Possibly in the past West Chester State Teachers College has become best known for its nature work because of the work of Dr. Samuel Christian Schmucker, author of " The Study of Nature " and now emeritus professor from the institution. At present, the work there is being carried on by Thelma Greenwood. The institution has required courses in biology, nature study, earth science and health education. The content of the nature course apparently is largely biological and much effort is made to teach from first-hand materials. At the Slippery Rock State Teachers College, Dr. R. A. Waldron is the head of the science department. Dr. Waldron is co-author with Dr. Eikenberry of Trenton, New Jersey, of a new book on educational biology which is entirely worthy. He has featured the teaching of nature study in the camp situation and has developed a camp in connection with the college which represents a pioneer piece of work among teacher-training institutions. The course in nature study or elementary science offered at Slippery Rock is well balanced between the biological and physical sciences. At the Indiana State Teachers College at Indiana, Pennsylvania, Dr. Thomas Smyth is in charge of the science work. The classes in nature study are large, sometimes totalling two hundred and fifty students per semester. The content of the course is largely biological and involves as much first-hand experience in the field as is permitted by the time schedule. At the State Teachers College at East Stroudsburg, the position formerly held by Dr. Eikenberry is held by Elwood D. Heiss. Judging from the report at hand, one might say that the type of work offered is almost identical with that offered at Indiana and at West Chester. In all the schools, elementary teachers take a three-hour course in educational biology and another three-hour course in nature study. At the state teachers college at Lock Haven, L. J. Ulmer is in charge of nature work. At the college at Clarion, H. S. Manson has this responsibility and Joseph H. Hurst is head of the science department at the State teachers college at California, Pennsylvania. At Bloomsburg, the science work in the state teachers college is cared for by D. S. Hartline, who is the science head. He has submitted a most satisfactory report which shows unusual appreciation of the requirements of his position and faithfulness in fulfilling the recognized obligation to give those who are to work in the elementary field the type of help which will prove to be most useful. While the science offerings in Mr. Hartline's course are largely biological they evidently strongly emphasize field experiences as being of primary importance. The science teachers in the teacher-training institutions of Pennsylvania apparently teach an average of eighteen hours a week to classes averaging thirty-three in number.

The reports we have from Pennsylvania communities follow:

Altoona.—The weekly time allotment is as follows: First grade, fifty minutes; second and third, seventy-five each; fourth, one hundred; fifth and sixth, one hundred seventy-five each; and seventh, two hundred. Frequent correlation is made with geography and art. It has been found difficult to maintain the desired teacher interest in Altoona.

Aliquippa.—Olive Tschippert is responsible for elementary science work. The time allotment is as follows: First three grades, thirty minutes each; fourth, fifth and sixth, sixty minutes each.

Avoca.—Nature study is optional and when given has the following time allotment: Second and third grades, thirty minutes each; fourth and fifth, forty each; sixth and seventh, forty-five each; eighth, sixty, and ninth, one hundred eighty.

Bangor.—A. W. Ackerman is responsible for nature work in the elementary grades and H. O. Isenberg for high school science. The weekly time requirement calls for the following: First grade, twenty minutes; second, forty minutes; third to fifth, thirty each, and sixth, forty-five minutes. Provision is made for field work in all of the grades. It has been difficult to secure adequately trained science teachers.

Bridgeville.—E. O. Ligitt is responsible for elementary school science and Robert Wray for the high school science. The only time requirement is for the ninth grade where three hundred minutes a week are required.

Coplay.—A printed outline is used and William Shetlock is responsible for science teaching. The time allotments follow: The first three grades, thirty minutes a week; eighth, two hours, and ninth, four hours.

Erie.—The weekly time allotments call for the following: First grade, fifty minutes; second and third, seventy-five each; fourth, one hundred; fifth and sixth, one hundred fifty each, and seventh and eighth, one hundred seventy-five each.

Gettysburg.—L. C. Keefauver is science supervisor or teacher for the school system. The weekly time allotment follows: First and second grades, twenty minutes each; third and fourth, thirty each; fifth and sixth, forty each; seventh and eighth, ninety each, and ninth, two hundred. Correlation is common with reading and geography.

Jenkintown.—Hazel Everett is science teacher for the elementary grades and C. K. Wagner for the high school.

Lansford.—The time allotment follows: First three grades, forty minutes each; fourth, eighty; fifth, one hundred twenty; sixth, seventh and eighth, one hundred sixty minutes each. There is common correlation with reading and language and a mimeographed outline is followed though it is reported that it is difficult to master the time problem.

Latrobe.—A special nature room is being provided in each school building. Marion J. Bitner is responsible for the elementary school science and Mark Funk for that at high school levels. Eighty minutes per week are required in each of the first eight grades and two hundred in the ninth. A mimeographed outline is followed which is correlated with art, geography and literature. It is apparently difficult to secure adequate student reference books.

Munhall.—The work is restricted to that found in the regular readers.

Nanticoke.—Science and nature work are closely correlated with geography.

Northumberland.—N. A. Darrowsky is responsible for elementary school science and Neal W. Wormley for high school science. The weekly time allotments follow: First and second grades, fifty minutes each; third, fourth, fifth and sixth, sixty each; seventh and eighth, one hundred twenty each, and ninth, two hundred twenty-five. The science and work in health are closely correlated.

Palmerton.—Mrs. C. H. Wills and John M. Messeswit are responsible for elementary school science and Robert Miller for high school science. Correlation with geography is common in the elementary grades. The time allotments are these: First grade, thirty minutes a week; second and third, forty-five each; fourth, fifth, sixth, seventh and eighth, sixty each and ninth, two hundred forty.

Parnassus.—Home room teachers are responsible for the work in the elementary grades and Clair Walter for high school science. The weekly time allotments are these: First and second grades, forty minutes a week each; third and fourth, sixty minutes each. Laboratory work is carried on in the science taught in grades ten to twelve.

Pen Argyl.—Channing Barton is nature supervisor and J. Banks Lahr cares for high school science. The time allotments follow: First four grades, forty minutes each; fifth and sixth, sixty minutes each; seventh and eighth, ninety minutes each, and ninth, one hundred and twenty minutes. Printed and mimeographed outlines are followed and field work is carried on in grades six to twelve.

Pittsburgh.—The Frick Training School for Teachers in Pittsburgh, and the University of Pittsburgh have had a healthy influence on developing a strong nature or science program in the schools of the city. Andrew Lester is in charge of training in science for teachers at the Frick Training School. He is primarily interested in the ecological phases of plant and animal life and teaches along this line. Kindergarten and elementary teachers graduating from the school have an average of two hours credit in science and science methods to help them in their work. The course given these teachers is largely biological though work in light, heat and sound is also given. Strangely enough, for Pittsburgh, agriculture and forestry are emphasized in preference to mining industry and commerce. A most helpful course in museum appreciation is given by the University of Pittsburgh under the direction of Dr. O. E. Jennings and this has helped greatly with teachers in service. The nature and science work of the city is the responsibility of Dr. John Hollinger. The course from kindergarten through the ninth grade is available in printed form and has many unique features. The content of the first two years and the kindergarten does not show evidence of specialization in particular fields. In the third grade, however, all work for the year except one week is devoted to mammal study. In the fourth year, birds are studied to the exclusion of other topics. In the fifth year, there are thirty weeks planned for the study of wild flowers, four weeks on an aquarium, two weeks on the sun and four weeks on water. The sixth grade is less specialized than its immediate predecessors but emphasizes garden work. In the seventh grade, the earth and its neighbors and forests are studied. In the eighth grade, food and shelter problems are featured and in the ninth grade transportation, communication, water supply and living things are the main topics featured. The whole program is splendidly enriched by ample equipment for visual instruction in its many forms. A far-sighted policy has been adopted by which this phase of the work will gradually be built up into a decidedly worth while educational activity. It seems that the best nature work is probably being done in the schools of the platoon type where teachers with superior training may be used. A strong City Garden Club that apparently does more than hold meetings and talks about gardens has done much to help establish and maintain school gardens and public interest in them. There is also a decidedly active Nature Study Club which draws its membership from the teachers of the elementary schools. This club owns a lodge and equipment amounting to four thousand dollars and cooperates with the University of Pittsburgh in certain courses designed for helping teachers. The Pittsburgh program is undoubtedly one of the most thoroughly organized and well supported programs of the country. There seems to be nothing to compare with it within the state or within many neighboring states.

Rochester.— Laureame Anderson and Denton M. Allbright are responsible for elementary school science and Elton Dare has the high school science work under his care. The time allotments are these: First and second grades, twenty minutes each weekly; third, forty; fifth and sixth, eighty minutes each and seventh, eighth and ninth, sixty each.

Sayre.—Evelyn Peck is responsible for high school science work. Nature work is optional in the first six grades where it may be taught for forty minutes per week in each grade. It is required above this grade on the following schedule: Seventh and eighth, one hundred twenty minutes each, and ninth, three hundred minutes.

South Brownsville.—Charles Miller is responsible for elementary school science and Chauncey Shives for the high school work. A printed outline is followed in which science or nature work is required in all grades as follows: First grade, twenty-five minutes a week; second, fifty minutes; seventh, eighth and ninth, three hundred minutes each. Correlation with reading and history work is urged.

South Fork.—Clyde Bounds is responsible for elementary school science and Kenneth Mudridge for high school science. Science is not required below the ninth grade but may be elected on the following schedule of minutes per week: Fourth and fifth, forty minutes each; sixth, sixty, and seventh and eighth, one hundred each. In the ninth grade, there is a requirement of two hundred and twenty-five minutes per week. It seems to be difficult to secure sufficiently enthusiastic elementary school teachers with the proper training to do good science work.

Southwest Greensburg.—Clair C. Kelley is the high school science teacher. A weekly time requirement is maintained as follows: Seventh and eighth grades, one hundred twenty minutes each and twice this in the ninth grade.

Washington.—M. B. Horner is responsible for high school science. Correlation is made with science and geography and reading in the elementary grades but the value of science work does not seem to be generally appreciated by the older teachers.

Wilkinsburg.—Mary Fornwalt is nature study supervisor in the elementary grades and W. S. Woodburg is responsible for high school science. The weekly required time allotments follow: First and second grades, fifteen minutes each; third, twenty minutes; fourth, twenty-five, and fifth and sixth, forty. Correlation is common with geography and a printed outline is followed.

RHODE ISLAND

The State Department of Education has recognized nature and science work as a school activity in all grades since 1845. The Rhode Island College of Education has done much to foster the work in the state and since over ninety per cent of the teachers of the state are graduates of that institution the influence has been very real. For some years, Dr. W. G. Vinal was prominently identified with nature work in the state and in its teacher-training institution. For over forty years, the state has published a splendid series of Arbor Day bulletins written primarily for pupils' use and presenting splendid helps for the study of nature. These have usually been thirty-two pages in length and recently have appeared in editions of 95,000 copies. The Arbor Day pamphlet has been a special work of Dr. Walter E. Ranger, Commissioner of Education and a great lover of nature. Rhode Island is essentially urban and the state program which was published some years ago has kept this in mind. The outline is available to all teachers of the state but its use is not compelled.

At the Rhode Island College of Education, Marion D. Weston is professor of biology and nature study. The teachers graduating from the institution receive on an average six semester hours of credit in science. A course in biology involving methods and content is required of the graduates and there are other courses in nature study, earth science and paleontology on an elective basis. The problem of the field trip is reported as being very difficult and as a result field trips have not been required during the last year and most materials have been presented outside their natural setting. A new bus has been made available which may help solve the problem another year.

The Rhode Island Field Naturalists Club, Inc., has done much to encourage work in nature education out of doors. During the spring months, trips by this club have been held nearly every week and have been announced months ahead so that the destination, subject and leader are known in advance to those desiring to participate. An active Audubon Society has a most creditable library of the " travelling " type which has helped much. The society also has acquired splendid bird reservations and sanctuaries for which it is responsible. It has published a check list of Rhode Island trees. The Rhode Island Humane Education Society has helped particularly in Providence. The Roger Williams Park Museum at Providence has done much to help in matters of local education and for some years published '*The Roger Williams Park Museum Bulletin*" which was outstandingly useful in the manner in which it presented nature content. It has been supplemented by the *Roger Williams Naturalist.* A recent number may be taken as representative. In it we find a delightful story "A Search for Eight Footed Folk" by Maribelle Cormack. The bulletin is splendidly illustrated and contains, in addition to the story, announcements of various meetings at the museum of interest to naturists. Dr. William Bryant, director of the Museum, has always recognized an obligation to satisfy the needs of the children who visit the institution for which he is responsible. A story of "The Real Hiawatha" by Dr. Bryant which was published in the April, 1930, *Roger Williams Naturalist* would be valuable reading for any schools in northeastern North America, or for that matter elsewhere.

We have returns from two Rhode Island communities indicating the nature and amount of work they are doing. They follow:

Barrington.—Earle S. Collins is in charge of high school science. The only time requirement is for fifty minutes in the eighth grade.

Westerly.—The weekly time allotments are as follows: Second, twenty minutes; third, thirty minutes; fourth, forty; fifth and sixth, sixty each; seventh, ninety, and eighth and ninth, one hundred eighty each. No provision is made for correlation work. A mimeographed outline is followed.

SOUTH CAROLINA

Nature and science work has been recognized as a school activity above the sixth grade by the South Carolina State Department of Education since 1906. It has been recognized as an activity of grades four to six since 1920. Practically all public schools, according to the State Department of Education, teach some nature study. No state supervision of the work is provided and no work in science is required aside from the teaching of general science in the eighth grade. Provision is made, in the recommended state program, for laboratory work in grades eight to twelve. These programs are available to all the schools of the state in a printed form. The state outline in science for the elementary schools was prepared by Herbert K. Job, who was for some years, State Director of Nature and Conservation Education. He has recently gone into similar work in Virginia.

At the State Agricultural and Mechanics Arts College at Orangeburg, a course in nature study is offered in the summer. There are also required courses in biology and chemistry provided for students intending to enter teaching at the elementary grade levels. The school graduates about forty students a year who will probably be called upon to teach or supervise nature or science work in the elementary schools. The course offered in nature study deals both with the physical and biological sciences and recognizes a relationship between the content and agriculture, industry and commerce. Supervision of science work in the practice school of the institution is given by Sarah I. Sampson.

The few returns we have from South Carolina communities follow:

Columbia.—Julia Pickens Gaillard, supervisor of elementary education, is responsible for the elementary school science for which there is no apparent time requirement. Correlation with the social studies seems to be very common. It is reported that it is difficult to secure adequate materials for study purposes.

Summerville.—Edward Sanders is in charge of high school science. There seems to be no time allotment below the seventh grade. Three hundred sixty minutes each, per week are required in the seventh and eighth grades and in the eighth and ninth grades considerable work is done in floriculture and plant propagation.

SOUTH DAKOTA

The "South Dakota State Course of Study" for elementary schools does not include nature study as one of its subjects, but does include agriculture. Three of the four state teachers' colleges offer nature study work in preparing teachers. At Spearfish State Teachers College, F. L. Bennett is the teacher of biology. At this institution, there are about four faculty members who teach science to prospective elementary school teachers. Rural teachers graduating have had, on an average, two hours of science work and the same is true of elementary grade teachers. Kindergarten teachers are not required to take work in science. The materials studied in the course in nature study, which is elective, are for the most part preserved specimens though a considerable number of kinds of things are seen in a fresh, living condition. About ten field trips a term is the average number made in the nature study classes. The institution has a required course in hygiene and sanitation but the other science offerings are on an elective basis.

The Lake Enemy Swim Biological Station whose director is

S. R. Lipscomb of the Northern Normal and Industrial School at Aberdeen held a session in which field biology was taught from July 21st to August 30th, 1930.

We have a return from but one South Dakota community. It follows:

Mitchell.—Maude Flannigan and Gertie Belle Rogers are responsible for nature and science work at the elementary school levels. Florence Harrison and Helen Watson have the same obligations at the high school levels. The work is correlated with English and with art and is given with a weekly time allotment as follows: First six grades, thirty minutes each; seventh one hundred eighty; eighth, one hundred twenty, and ninth, three hundred. It is reported as being difficult to secure adequate time and equipment to do good work.

TENNESSEE

We have no evidence that there is a state course in nature study or elementary school science in Tennessee. There is much evidence of interest in the field from a number of the higher institutions of learning. The University of Tennessee offers courses specifically designed to help nature teachers and graduate degrees have been given in which the thesis developed was concerned essentially with problems of science education at the elementary school levels. There seems to be genuine interest on the part of the administration and of a number of department heads in strengthening this type of contribution to education. At the George Peabody College for Teachers at Nashville, a strong program has been built up through the efforts of Dr. Hanor Webb in the field of physical sciences and the secondary school science and Dr. Jesse Shaver in the field of biological sciences and the elementary school science work. The work of these two individuals overlaps to a considerable extent. Dr. Shaver's schedule calls for the teaching of thirty-one courses with five assistants and Dr. Webb is responsible for twenty-six courses with four assistants. Three of the above courses ascribed to Dr. Shaver may be considered as essentially of the educational method type and eight of those ascribed to Dr. Webb may be considered of this type. Dr. Webb is possibly best known as one of the authors of Webb and Didcoct's " Early Steps in Science " or as the editor of " Current Science." He is a prolific writer and has been prominent in the professional organizations interested in the teaching of science.

Kindergarten, rural and elementary grade teachers graduating from the institution have generally received twelve hours of credit in science work in which one hour of credit represents twelve fifty-minute periods of work. There seems to be good evidence that a generous portion of the science experiences of the prospective teachers is of the first-hand nature with living things where they are appropriate. While no course in biology or nature study is required of elementary school teachers most of them elect to work in this field apparently. In addition to the required twelve hours of work in science, teachers are required to take sixteen hours of physical training and six hours of health instruction. At the East Tennessee State Teachers College, D. M. Brown is professor of biology and is responsible for the science training of prospective elementary school teachers. At this institution, there is a required course in biology of three hours, a nine-hour required course in the earth sciences and a six hour course required in health and sanitation. The institution is suitably located for field work and apparently the most is made of the opportunities which the situation offers. The school enrolls as high as a thousand students during the summer session, some seventy-five per cent of whom are working or are to work in the elementary field. In addition to the required work listed above, the biology department offers nineteen hours of botany work in five courses, six courses in zoology totalling eighteen hours and one course in general biology of three hours. The work in these courses is largely of the content type. There is a state requirement of eighteen hours in biology for those desiring to teach biology in the high school and this requirement may be met at the East Tennessee State Teachers College. The work in nature study or elementary science is taught by the geography teacher.

The move to establish the Smoky Mountain National Park in part within the limits of Tennessee has been supported to no small degree by citizens who were nature minded. A decidedly active Smoky Mountain Hiking Club has helped to lay trails through the wildernesses and induce many to become acquainted with a most attractive area easily accessible to a large number of the population centers of the country. The Chamber of Commerce at Knoxville and its secretary, Mr. Carlos C. Campbell, have been responsible for many of the worthy developments in connection with the new park area and have received good support from the qualified leadership available at the University of Tennessee.

We have no returns from Tennessee communities in which work in nature or science is required in the elementary schools.

TEXAS

Work in science and nature education has been a recognized school activity in the elementary and secondary schools of Texas since the organization of the State Department of Education. The University of Texas, the state teachers colleges, the state health department and the Agriculture and Mechanical Arts College at College Station have provided guidance and assistance in the program. Particularly influential in the development in southern Texas has been Mrs. Ellen B. Schulz of the San Antonio Public Schools. The State employs a supervisor of sciences, W. E. Gattis, who works with A. M. Blackman, chief supervisor of high schools and others of the state department in strengthening the work through the state. This is done largely through school visitation and the preparation of teachers' guides. During the last year, printed outlines totalling about two hundred pages reached approximately four thousand science teachers in the state and in addition some twenty pages of mimeographed materials were sent to twelve hundred science teachers. The " Elementary Course of Study " for the state requires the teaching of nature study in grades one to three; hygiene, in grades one to seven; agriculture, grade seven; and geography, grades three to seven. Each classified high school of the state must be equipped to teach at least one science and most of these schools require one science for graduation. The time schedule for science through the twelve grades calls for the following weekly allotments, those given for the first seven grades being required and those for the upper grades being elective: first and second, nature study, one hundred fifty minutes each; third, nature study and hygiene, one hundred fifty minutes; fourth, hygiene, one hundred fifty; fifth, hygiene, two hundred fifty; sixth, hygiene, one hundred fifty; seventh, agriculture, one hundred fifty; eighth, general science; ninth, biology or physiology; tenth, chemistry or physics; eleventh, physics or chemistry, three hundred fifteen minutes each. Correlation with geography is frequent in the lower grades. There are lists of recommended texts for all the high school sciences but there is a certain choice permitted. In the fourth grade, " Health for Every Day " is a required text and in the sixth grade, " Health in Home and Neighborhood " is required. Both of these books are published by Silver, Burdett and Company of Newark, New Jersey. There are a number of very satisfactory printed helps for the teaching of science in Texas. In 1914, the University of Texas published an interesting bulletin " Nature Study and Agriculture for the Rural Schools of Texas " by W. S. Taylor and C. H. Winkler. Later, in 1924 the State Department of Education published a " Manual and Course of Study for the Elementary Grades, Public Schools of Texas." In this outline, the work is so organized that correlation is made with language, geography and with other subjects. In 1929, the State Department also published a bulletin on " Revised Textbook Regulations " by R. D. Henderson in which appeared complete accounts of the laws and book adoptions for the state, with science given a place, of course. In the same year, there also appeared from the State Department a highly acceptable bulletin " Texas High Schools, The Teaching of Science." This bulletin should be valuable to any high school science teacher. The content presented is purely of the " skeleton " type but the teaching suggestions and supplementary references are such as the teacher could not expect to find in the average text book. Manuals of this type should be more generally available. We have returns from but one of the state teachers colleges. At the Stephen F. Austin State Teachers College, C. C. Johnson is professor of physical science and reports the following data. The institution does not offer a definite course to prepare special teachers of science or nature study. One year's work (nine hours) in biology is required of kindergarten, rural and elementary teachers graduating from the school. In general, the materials studied are seen alive in the classroom, there being little field work except in the courses in agriculture. About half of the information presented is given without the assistance of any visual aids. At the Texas College of Arts and Industries at Kingsville, Texas, Clyde T. Reed is director of the department of biology. He reports that there exists a rather remote relationship between the faculty members who provide prospective teachers with subject matter and those who train them in the art of eighty-four individuals in the state. The required schedule existing at present for the state is as follows: First three grades, fifty minutes each, weekly; fourth, fifth and sixth grades, forty-five minutes each weekly. In the seventh grade, " nature-geography " is given but no regular science work is scheduled. In the eighth grade one hundred thirty-five minutes weekly are required on physical general science and two hundred twenty-five minutes may be spent on it. The same allotments exist for the ninth grade where biological general science is required. In the eleventh grade two hundred twenty-five minutes a week may be elected in biology, botany or zoology, and in the eleventh or twelfth, two hundred twenty-five minutes of physics or chemistry may be elected. Dr. J. H. Paul, author of " Out of Doors in the West," played an important part in nature education at the elementary school levels. He also served on the faculties of the state agricultural college and the state university. The State Agricultural College supported a National Summer School which should have drawn nation wide support because of its ideal location near the great Bear River Bay marshes of Great Salt Lake and the mountains about Logan Canyon. The state has much to offer in the field of nature education. In addition to the offerings of the state institutions, Brigham Young University maintains a Lakeside Biological Laboratory at the mouth of the Provo River on Utah Lake. This is maintained under the direction of Professor Vasco M. Tanner of Provo, Utah.

The only Utah community from which we have a report is Logan and here we find no science or nature work required below the ninth grade. Harold Peterson is responsible for the high school science at Logan.

VERMONT

Science and nature work has been a recognized school activity of the first six grades of the elementary schools of Vermont since 1900 or earlier according to the State Department of Education. It has been recognized as a seventh and eighth grade activity since 1921 and for many years, of course, has had a place in secondary education. No state inspector of science is employed by the state. The state has provided printed manuals of study which should be helpful to science teachers of the public schools. The "Courses of Study in Science" published in 1928 treats of general science, biology, chemistry and physics and provides skeletal outlines of topics with suggestions as to methods, equipment and references which should be generally useful. There appears to be a healthy viewpoint of the authors towards the use of local illustrative materials and an organization calling for problem-solving rather than a mere memorizing of facts. Rural, primary and grammar school teachers are required to have had at least two hundred and fifty clock hours of work in science before receiving their certificates. The work required is slightly increased for teachers in the junior high school and approximately doubled for the senior high school. The teaching of nature study or elementary science is not required in the elementary schools of the state but is cared for to some degree in the state outline for work in geography. The agricultural college at Burlington has been responsible for a number of useful bulletins, notable among these being "The Trees of Vermont" and "The Shrubs of Vermont." We have no record of activities in the teacher-training institutions of the state which would indicate generous preparation in the field of nature or science education.

The reports from local Vermont communities follow:

Bellows Falls.—Floyd Somerville is responsible for the science in the high school. No particular outline is followed in the grades but the following required weekly time allotment is made. First and second grades must receive fifteen minutes each; third and fourth, twenty minutes and fifth and sixth, thirty minutes.

Burlington.—No person is responsible particularly for the science work of the city and no definite time allotments are made. Correlations are common with geography and art on a time schedule which allows but does not require the following allotments: First and second grades, fifty minutes each; third and fourth, seventy-five minutes each; fifth and sixth, one hundred minutes each, and eighth and ninth, two hundred minutes.

Springfield.—Science work in the grades is incidental and not organized as a separate subject. Harold W. Chandler is head of the high school science department.

St. Albans.—Madaline Taylor is responsible for high school science. The elementary school science is correlated with geography, drawing and health work on an allowed but not required weekly time allotment calling for sixty minutes of work in each of the first eight grades. It is reported as being difficult to secure qualified teachers to do satisfactory work in science and nature education.

VIRGINIA

According to Thomas D. Eason, secretary of the State Board of Education of Virginia, some sort of science instruction has always been offered in the elementary schools of the state. While the State Board of Education has not reached the point of employing a state supervisor of elementary science, it does provide through its course of study and through encouragement by the supervisor of secondary education, the supervisor of trade home economics and agricultural education and the supervisor and district supervisors of physical education some sort of aid. These officers have been sympathetic towards strengthening science work and the secretary of the state board was for many years an instructor in science. There is some provision for science and science teaching made in a number of bulletins published by the state board among these being " State Course of Study for Rural and Elementary Schools in Virginia," " State Course of Study for Science," " Laboratory Equipment for Science," "Physical Education Course for the Elementary Schools," " Physical Education Course for the High Schools," " Home Economics Course for the High and Elementary Grades." On May 1st, 1930, Herbert K. Job, formerly director of nature and conservation education of South Carolina, began work in Virginia under the supervision of the State Commission of Game and Inland Fisheries and the State Board of Education. Most of his work will be directed towards interesting school children in the conservation of wild life and in helping in the teaching of nature study. Mr. Job is, of course, more than amply qualified to render superior service in this capacity. Other individual leaders of nature education in the state are Dr. F. C. Maybee of the State Teachers College at Harrisonburg and D. N. Rucker, who is working in Richmond in the elementary city school system. At the East Radford State Teachers College, E. C. Cocke, Paul R. Burch and Dr. W. J. Sowder are responsible for work in biology and nature study. There seems to be evidence that the field work in biology and biological nature study emphasizes first-hand experiences and that the general offerings recognize all the important fields of science. Practical use of the knowledge is associated with agriculture, forestry, industry and mining. At the Virginia Normal and Industrial Institute at Petersburg, Edna M. Colson is responsible for the elementary school science. It is pointed out that nature study and elementary science are not greatly emphasized in the negro schools of Virginia and that this is partly because the teachers of these schools are not trained in this type of work. This institution has a required course in biology and one in health work but none in elementary science or nature study. Apparently it is the practice at this institute to use preserved material for illustrative purposes more largely than living materials in their natural setting. At the 1930 summer quarter of the University of Virginia, some ten or twelve courses in biological science and ten courses in physical science were offered with teachers' courses for those teaching science in the elementary field and others for those teaching in the secondary field. We have no returns from any specific Virginia communities indicating the nature of the work they are offering. The state course of study gives what seems to be a well organized course suitable for use in various types of communities. Nature study appears as community study in the first three grades and seems to be somewhat comparable to that followed in Minnesota. Nature study appears as a division of history and geography for the fourth, fifth and sixth grades. Twenty-five minutes a day are allowed on the time schedule for community study in the first four grades and thirty minutes a day for history-geography in the fifth and sixth grades.

WASHINGTON

Nature and science work has had a recognized place in the elementary and secondary schools of the State of Washington at least since 1913 according to returns from the State Department of Education. The State employs no state science supervisor but performs supervision service involving school visitation, attendance at teachers' meetings and the preparation of teachers' guides. A new elementary course of study is being prepared according to Minnie D. Bean of the department of elementary supervision. In this outline, nature study work is being combined with geography work. This outline has not been received by the writer for review in this edition of the *Almanac*. Elementary grade teachers of Washington are required to have had three quarter-hours of work in science before receiving their certificates. High school teachers are required to have a major or a minor in the subject taught, these totalling forty or twenty-five hours as the case may be. There seems to be no required time allotment for the first six grades but three hours of work a week are required each week in the seventh and eighth grades and four hours in the ninth. This work apparently is largely in general science. Biology may be elected in the tenth grade with a time allotment of three hundred fifteen minutes a week and physics and chemistry in the eleventh and twelfth years with a similar time allotment. There is no state adoption of text books in Washington. The state outline in science for the first six grades is being prepared under the leadership of Jeanette Donaldson, who has had experience as an elementary school teacher, a normal school instructor, a county superintendent and as a member of the elementary division of the State Department of Education. The University of Washington has, of course, been strong in its offerings in pure science but has done little to help those who are called upon to teach science or nature work in the elementary schools. Professor August Dvorak of the University of Washington has been responsible for some widely used general science tests. The University has maintained the nationally known Puget Sound Biological Station at Friday Harbor where the work is essentially of the research type. The 1930 session extended from June 16th to August 15th and the director was Dr. T. C. Frye of the Department of Botany of the University at Seattle.

We have returns from two of the state's normal schools indicating the type of work they are doing. At Bellingham, Leona Sundquist is the instructor in charge of teaching science to elementary school teachers. The institution has required courses in biology, nature study, earth science, health education, physics and chemistry. The average number of hours in science which an elementary teacher gets, however, is three and this holds for kindergarten and rural teachers as well as for those going into city elementary schools. The report at hand shows every evidence that study of living things in a natural setting is the practice at this institution. This is borne out by the statement that about eighteen field trips are held a term in the course designed to help elementary teachers. The content is apparently selected from the fields of physical and biological science and associations are made with forestry, agriculture, industry and commerce. At the normal school at Cheney, J. W. Hungate is responsible for the work in nature education. The general requirements are apparently about the same as those of the Bellingham institution though there are fewer required courses and there seems to be considerably less emphasis on studying in the field. The average number of field trips is about four per term in the introductory course. The Mount Rainier National Park has had some influence on nature education in the northwest. It has had good park naturalists and has published *Nature News Notes* as a periodical record of points of interest associated with the park. These notes have dealt with simple explanations of the more conspicuous natural phenomena of the park and have included treatment of glaciers, trees, mammals, birds, geology and other science units. The returns we have from Washington communities follow:

Auburn.—Flora M. Holt is responsible for the elementary school science and Frederick Smith for that at the high school level. A mimeographed outline is followed in which the following time allotment each week is observed: First and second grades, seventy-five minutes each; third and fourth grades, one hundred fifty minutes each; fifth grade, two hundred minutes, and sixth grade, two hundred twenty-five minutes. Three hundred minutes may be elected in the ninth grade.

Bellingham.—D. E. Wiedman is responsible for the elementary school science and E. F. Wells for that of the high school grades. The work in the elementary schools is correlated with language generally and there is no time allotment required. Two hundred fifty minutes may be elected in the eighth grades. Bellingham holds the distinction of being the only community in the United States to have stated that expense was a factor which prevented the teaching of more science in the schools.

Cle Elum.—Ira Thomas is responsible for high school science. No science work is carried on in the grades apparently.

Ellensburg.—Mrs. E. J. Merryman is responsible for elementary school science and Beatrice Buzzetti for high school science. The required weekly time allotment is as follows: First five grades, forty minutes each; sixth, fifty minutes; seventh and eighth, one hundred minutes each, and ninth, three hundred minutes. The work is correlated with hygiene and geography and no definite outline is followed.

Raymond.—A new course of study in nature study is now being developed for use in the schools of Raymond.

Toppenish.—Superintendent O. Krienke is responsible for elementary school science and E. E. Hardinger for the high school science. The work is generally correlated with geography and language and the following weekly time allotment is required: Second and third grades, one hundred minutes each; fourth, fifth and sixth, seventy-five minutes each.

WEST VIRGINIA

The " Course of Study for the Elementary Schools of West Virginia " prepared under the direction of L. T. Tustin, state supervisor of rural schools of the State Department of Education, calls for the grouping of the first, second and third grades and of the fourth, fifth and sixth grades into two separate units. Each varies the subject matter over a three year cycle. This makes it possible to suggest a six-year course and triple the amount of time given to the subject each year over what would be allowed if the work of all six years were given each year. There are, then, two classes in nature study for the first six grades, one of the lower three and one of the upper three grades. The nature study of the seventh and eighth grades is elementary agriculture in the rural schools. The introduction to the course says: " Nature Study as a definite subject has not received the emphasis it deserves in the elementary schools of West Virginia. It is really a study of the things which go to make up life and which are found in every environment. This study, the direct observation of things, links up these things with every-day life. Nature study is a study of things and not about things. Hence outdoor work is essential. A class in nature study should have definite periods in the day's program." Nature work at the State University is favored in connection with the activities of 4H Club Work under the leadership of Professor H. B. Allen and through the activities of Dr. Stemple. Professor Allen believes that " nature study is the most important basic link in all science instruction." At Marshall College, the nature and science courses intended for high school teachers are taught by Professor F. A. Gilbert and those designed for the elementary teachers by M. P. Loy. Other courses in biology and zoology are taught by Professors Utterback and Gilbert and courses in geology by Earl Brown. In addition, a course in agriculture for rural teachers is taught by Mr. Muldoon. Elementary teachers graduating from the institution have had at least six hours of science preparation, the required courses including work in nature study and earth science. There is evidence that emphasis is placed on the study of living things in their natural setting where this is appropriate and that the nature study content is essentially biological. At Morris Harvey College, the offerings for elementary teachers are somewhat similar to those of Morgan College. There are, however, required courses in biology, nature study and earth science instead of but the two fields already noted. C. J. Harris is responsible for much of the work at Morris Harvey. At the Fairmont State Teachers College, C. M. Roberts is head of the biology department and responsible for the science training of prospective elementary school teachers. There are two required courses, one in biology and one in nature study and the content of the nature study course is evenly balanced between the physical and biological fields. At least half of the work is taught without visual aids according to the report at hand. A total of about eleven field trips is made during the term in the nature study course. At the Concord State Normal, Frank Cutright is the head of the biology department and responsible for the offerings in science to elementary teachers. Great emphasis seems to be made on field trips which average some twenty a term and there seems to be evidence that living materials in their natural setting are studied wherever possible. The content of the nature course seems to be largely biological. Dr. Stemple of the University of West Virginia made an interesting study of the interests of various West Virginia communities to determine recommendations as to content for the state's high school courses in science. The University has also emphasized field work in biology and maintained in 1930 from June sixth through the succeeding six weeks a series of field courses in zoology, entomology and botany. These were rather nomadic courses calling for visits to important biological sites in the state and led by scientists of West Virginia and of other states.

At Oglebay Park on Waddington Farm, A. B. Brooks is the park naturalist. A museum is maintained at the farm where interested parties may learn of significant forms of wild life. Considerable living material is available for observation. In addition, nature trails are established for the use of park visitors. Regular docent service is maintained and Sunday morning bird trips have become decidedly popular, caring for as high as one hundred and eighty people on a given day. The park cooperates with the schools of Wheeling through the issuance of mimeographed material known as " Suggestions for the Nature Corner of your School Room." In addition, arrangements are made for children of the fifth and sixth grades to spend a day at the park under trained leadership. There is some cooperation between Waddington Farm and the University of West Virginia and the Coördinating Council on Nature Activities. Through this coöperation leadership training courses have been conducted, in one of which, in June, 1929, there were sixty-four students in attendance representing twenty-two communities and four states. The museum contains exceptional habitat units showing insects, particularly, and some valuable study collections for use by park visitors.

The returns we have from local communities follow:

Grafton.—C. W. Weaver is responsible for the science work in the community. The required time schedule calls for seventy-five minutes of work in science each week in the first two grades and allows the following expenditures in the other grades: Third, seventy-five minutes; fourth, fifth and sixth, one hundred minutes each; seventh and eighth, one hundred fifty minutes each, and ninth, three hundred minutes. Correlations are made freely with hygiene and geography.

Piedmont.—G. J. Knode is responsible for the high school nature work.

Wheeling.—D. B. Kraybill is responsible for the elementary school nature work and C. H. Ebbers for that in high school. The weekly required time allotments call for the following schedule: Eighty minutes in each of the first nine grades which may be increased to one hundred minutes. Correlations are made with geography.

WISCONSIN

We have no evidence that Wisconsin requires the teaching of nature study or elementary science in its schools below the seventh grade. It is required that agriculture be taught in all of the common schools of the state in the seventh and eighth grades. The state issues courses of study which provide guidance in the content taught and publishes Arbor Day manuals which contain some valuable content for use in the elementary grades. There seem to be no science requirements for those qualifying to teach in the rural and elementary schools according to the state department. General science is a required subject in nearly all of the junior high schools in the ninth grade. Biology is recommended for the tenth grade and chemistry is recommended for the eleventh. Physics is required in most high schools in the twelfth year. In the first six grades, nature and science work throughout the state seems to be frequently correlated with language and art. The state science outline is not available at present in printed form but is being revised. The state high school science outline was prepared under the direction of S. M. Thomas, State Supervisor of High Schools, and its use is not mandatory. There is no state adoption of textbooks in Wisconsin. While the University of Wisconsin has long held a prominent and an enviable place in the field of research in science it apparently does little or nothing to contribute directly to the training in science of elementary teachers according to C. J. Anderson of the School of Education. At the Oshkosh State Teachers College, J. O. Frank is head of the science department. The school is concerned primarily with the preparation of high school teachers and Professor Frank has contributed many valuable publications to the field of high school science education. Possibly the most important of these is "How to Teach General Science." He has also published recently "High School Science Terminology," Part One of which deals with the most useful terms of chemistry and physics. A course designed to help elementary teachers is taught by Earl A. Clemans in which both the biological and physical sciences are given consideration. The teacher of biology at Oshkosh is Hugh W. Talbot. At Platteville State Teachers College, Fred T. Ullrich is director of agricultural education and head of the biology department. He has recently completed an exhaustive survey of the offerings in science of the various teacher-training institutions of the country and published an article on the subject in the April 1930 issue of the *Nature and Science Education Review.* Of the some two hundred graduates of the school practically all of those who go into the elementary field are called upon to teach some science. There are required courses at the institution in nature study, earth science, health education and general and agricultural botany. Rural teachers graduating from the institution have had about seven hours of preparation in science, elementary grade teachers eight, one hour equalling eighteen sixty minute periods. It seems that the content of the nature study course is essentially biological and that most of the content is secured from the study of living things in their natural setting. At the Milwaukee Teachers College the science work is under the general direction of Professor W. H. Atwood, co-author with E. D. Heiss of "Educational Biology." The required course for elementary teachers consists of an orientation course in science. The biological phase is essentially that which has come to be known as educational biology. The physical science is of the survey type. A course designated as " nature study " was given during the summer of 1930 to teachers who were in service during the year. At the La Crosse State Teachers College, Oren Frazee is head of the department of biology and in general charge of the nature education at the institution. Besides a comprehensive required course for the training of elementary teachers in science, elective courses are available for those going into high school work. A considerable amount of outdoor teaching is done. The required courses include biology, earth science, nature study and health education. At the Superior State Teachers College, T. J. McCarthy is responsible for the nature study course for elementary teachers. At this institution, there are two courses offered in nature study consisting of three hours a week for eighteen weeks, one course on birds and another on trees each meeting two hours a week. Another course in general science, meeting two hours a week for eighteen weeks, has some bearing on nature education. About one-third of the first semester in the fall is devoted to field work in which the students study living things in their natural setting. At Stevens Point State Teachers College, F. J. Schmeeckle is in charge of the science offerings for elementary teachers. Attention should be called in any study of nature education in Wisconsin to the research activities at The Trout Lake Limnological Laboratory sponsored by the Wisconsin survey and directed by Chancey Juday of the University of Wisconsin. The 1930 session extended from June 20th to September 1st. The returns from local communities in Wisconsin follow:

Beaver Dam.—Nature and science work may be elected for thirty minutes a week in each of the grades from second to eighth. An hour of science is required each week in the ninth grade. No particular outline is followed.

Berlin.—One hundred fifty minutes of science work is required each week in the eighth and ninth grades but no other provision for the work seems to be made.

Chippewa Falls.—A mimeographed outline is followed but no time allotment is made for science or nature work except in the eighth grade, where one hundred twenty minutes a week are required and the ninth, where two hundred twenty-five minutes are required.

Delevan.—E. G. Lange is responsible for the science program. Printed and mimeographed outlines and helps are available. The work is correlated with reading, geography and language and a time schedule is in effect which requires each week the following number of minutes: Second, twenty-five; third, thirty-five; fourth, fifth and sixth, sixty each; seventh, eighth and ninth, one hundred thirty. It is reported as being difficult to secure adequately trained and interested teachers.

Kenosha.—The same teaching difficulties just listed are to be found in Kenosha. Correlation of the science work is largely with geography and language. The weekly required time allotment is as follows: The first six grades, forty minutes each; the seventh, eighth and ninth grades, three hundred each.

Madison.—Mrs. Clara W. Ginty is responsible for elementary school science and John A. Riner for secondary school science. Correlation is made with every subject taught but there is a definite time requirement each week as follows: First and second grades, fifty minutes each; third and fourth, seventy-five; fifth and sixth, fifty each, and eighth, two hundred forty. The difficulty of securing an adequately trained teaching force is again brought out.

Manitowoc.—Robert Warburton is responsible for science in the first six grades and John Norman for the high school science. Correlation is made with reading and language. The formation of a new science program for the schools is under way seriously. The required weekly time allotment follows: First two grades, twenty minutes each; third to sixth grades, one hundred each; seventh and eighth, ninety each and ninth, two hundred fifty.

Oconto.—W. C. Hansen is responsible for high school and elementary school science. The work is correlated with reading and language and the following time is required each week: First three grades, fifteen minutes each; fourth to eighth grades, twenty minutes each, and ninth, two hundred seventy-five minutes.

Oshkosh.—S. D. Fell, the principal, is responsible for high school science. We have no evidence that science is recognized elsewhere in the program.

Shorewood.—Laura Kellar and Beulah Kobler are responsible for elementary school science and Oscar Granger for high school science. No definite outline is followed.

Wausau.—Gertrude McGuine is responsible for elementary school science and Margaret Ryan for high school science. We have no evidence that a definite time allotment is made. It is reported that it is difficult to secure adequately trained and interested teachers.

West Allis.—F. B. Coon is responsible for elementary school science and M. J. W. Phillips for high school science.. The work is correlated with language and a mimeographed outline is followed. The required time allotment calls for forty-five minutes a week in each of the first six grades and two hundred each in the seventh and eighth. The outline is seasonal and generally calls for the study of individual species of things in the particular grades though there is a generous number of general topics for which illustrative species may be found. It is apparently planned to emphasize different science fields in different years since all units proposed have not yet beer developed.

WYOMING

According to a bulletin published in May, 1929, entitled " Course of Study for Rural Schools " there is comparatively little nature education in the state program in Wyoming. There is some in the offerings for the sixth, seventh and eighth grades. The course outlined as agriculture contains some material such as is normally considered elementary science or nature study. The work for these three grades is so arranged that all classes may be taught at once on a common topic, the work being varied during a three year cycle so that there is no duplication. In one of these years the topic " Farm and Ranch Life " is elaborated and about one-fourth of the topics listed are similar to those appearing in nature education outlines elsewhere. The succeeding year the topic " Crops " is elaborated and more than half of the topics are like those sometimes listed as science or nature study. The next year the theme developed is " Farm Animals " in which about one-third of the topics listed are similar to those ordinarily treated as nature or science education. According to the time schedule, the whole program of each of the above listed units is to be covered in sixteen weeks allowing half-hour periods or totalling approximately forty hours of work a year. According to this, about ten clock hours would be given to the nature and science work one year; over twenty, the next year and between ten and twenty the third. This is certainly a more generous recognition than is given in many states which profess to give the work good recognition. Certainly the arrangement proposed is one of the sanest from the standpoint of the rural school situation and adapted with great ease to the urban community. In some ways, it is like the New York outline. In others it resembles the West Virginia outline and in still others the Illinois outline. In May, 1929, the State Department of Education issued a mimeographed bulletin outlining the work to be taught in biology in the high schools of the state. This is a reasonable, workable outline in which the teachers are allowed and urged to use local materials and encouraged to study living things in the field wherever possible. Useful suggestions for making field studies are given at the beginning of the outline. The State Department also publishes a useful " High School Text Book List " recording the better books in the various fields of science. The elementary life certificate for non-graduates who teach in the state required the taking of three hours work in nature study, agriculture or biology. There are no apparent science requirements for those receiving the certificate of elementary school counselor. The state provides supervision in the form of school visitation and guidance in connection with the preparation of the state outlines. The University of Wyoming offers a considerable number of courses during the regular year designed to help those who teach science. During the summer of 1930, they offered full-credit courses in botany, geology and zoology at the University Camp in the spruce forest of the Medicine Bow Mountains forty miles west of Laramie and at an elevation of 9,500 feet. The 1930 offerings included eighteen courses. One of the courses is known as " Methods of Nature Study " and is so arranged that students may spend four days of the week on the university campus and two days in the camp. The camp staff seems to be exceptionally well qualified to do outstanding work. We have returns from but one Wyoming community indicating the work being done. It follows:

Kemmerer.—The weekly time allotment of required work is as follows: First four grades, seventy-five minutes each; fifth and sixth, one hundred minutes each; seventh and eighth, one hundred eighty each; ninth, three hundred. Correlation is made with geography. The high school science work is the responsibility of W. C. Priestley.

Summary of the Survey

1. Requirement of the teaching of nature or science work by State Departments of Education does not guarantee general teaching of the work.
2. State outlines reported as mandatory for use on a state wide basis are not necessarily followed except in rural schools. They are frequently written by those whose background of experience, interests and training is essentially urban on an organization unsuitable for use in rural schools.
3. Recognition of courses for training for nature work outside the school situation is not general by State Departments of Education.
4. Recognition of courses in nature and science education as applied to elementary schools is not uniform in higher institutions of learning but these courses are demanding increased respect and support. There is a general need that these institutions improve their offerings in science suitable for use by those who will teach those who will teach at the elementary school levels.
5. Teacher training work in nature and science education particularly for the elementary school levels is inadequate and often inappropriate as shown by reports from training institutions, state officials and school administrators. There seems to be evidence that not all of these institutions recognize an obligation to support the science program for the lower grade levels in proportion to the per cent of their graduates who enter this field.
6. Despite unjustifiably heavy teaching loads, teacher training institutions recognize the merit of teaching nature through first-hand experience.
7. An increasing number of special training centers for learning of nature in a natural setting is evident in most parts of the country and is sponsored by institutions of the highest standing.
8. Correlation of the nature and science program with other subjects in the elementary grades is general and is not uniformly limited to special subjects.
9. Expense was reported as being a factor preventing more general teaching of nature and science in elementary schools but once. The most frequently reported difficulties centered about teacher training and curriculum organization.

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SCHOOL NATURE OUTLINE

E. Laurence Palmer

THE BIG IDEA

"The Fourth Yearbook of the Department of Superintendence of the National Education Association" devoted considerable space to various aims which might be considered in planning a nature course for use in schools. Other outlines have done the same with the result that a summary of the aims suggested is easily available to anyone who may be interested. It is unnecessary to duplicate indefinitely.

It is hoped that the present outline may provide a program whereby a child may learn through the evidence of his own senses that the environment in which he must live reacts with reasonable uniformity to treatment which he may give it. If he does one thing to a part of that environment and gets a definite reaction from it, it is probable that he can expect a similar reaction if he does the same type of thing to a similar part of the environment under similar circumstances. It is hoped that the experiences the child may gain in so exercising his senses may be useful not only as ends in themselves, but as providing him tools in the form of a vocabulary of experience and understanding as well as of words. This he may use to draw upon the experience of others for his own benefit and for the benefit of society. It is hoped that this will result in a type of applied education designed to encourage just evaluation of the natural environment in which he lives and do this in such a manner that the child will enjoy cultivating those faculties which lead to the best habits of living. It is believed that the experiences gained will be of great value in interpreting other experiences and in meeting sanely the problems which present themselves as the child begins to take his place in society. It is the hope that in developing along these lines it will not be considered that the improvement, for example, of the power of observation alone will be adequate accomplishment. Habits of industry, individual initiative, the ability to use but not abuse the imagination, should be preserved and developed and an understanding of the scientific method assured. It is the belief of the writer that frequently many of these desirable qualities are possessed to a greater degree by some children when they begin their school experience than is often possessed by the same children at the end of the first six years, and it is also the belief that to some extent at least this is so because through years of experience, teachers have found that certain procedures make their tasks easier even though they may deprive the children of what those children have a right to expect of the school.

In Bulletin No. 1 of the Bureau of Curriculum Research of Teachers' College, Columbia University, it was pointed out that in the belief of the judges there was a very great need in the elementary school of reducing the number of subjects and that the ideal course of study would be one in which the subjects of instruction lost their identity as individual subjects and largely grew out of large units of work. It was felt, considering the present status and qualifications of the teaching group, that the course would be best which treated the subjects separately with occasional correlation. The proportion of judges with rural teaching experience was not in the same proportion as the number of rural teachers to all teachers. It is the belief of the writer that in the rural and small town field particularly the more quickly the ideal suggested above can be approached, the quicker will the teacher find time to do well those things which ought to be done well, instead of devoting time to consideration of a crowded daily schedule of unrelated activities. To this end it will be found that the outline suggests frequently how topics presented may be used in motivating the firmly entrenched subjects, so frequently monopolizing the daily program. The writer realizes that he is not expressing the united sentiment of nature workers when he says that he hopes the time will come when nature work as such will not have to have a special time allotment on the daily program but will be a part of the whole or major activities of the elementary school. It is conceded that there are places where without a special time allotment nature work would have no place in school work but it should also be conceded that there are places where if it were more closely identified with the so-called three R's it would have a much greater time allotment than appears on the schedule.

The present outline has been written with the above expressed sentiments in view. It has endeavored to keep in mind and present the basic experiences which underlie the understanding and practice of forestry, gardening, agriculture, mining, power development, humaneness, health education, home-making and diet planning, and industries dependent upon marine resources. It has tried to keep in mind the need of recreation and beauty in life, while it has at the same time hoped to develop an appreciation and wise use of our natural resources. It has kept in mind the varied types of communities in which these suggestions may appear and tried to permit sufficient flexibility and choice to make adjustment to local needs without sacrificing the objectives for which it is hoped all may at least strive.

THE PROBLEM OF ORGANIZATION

Various problems face those who prepare outlines or guides for use in any school activity. The outline must fit the need. Local outlines too frequently are inappropriate for use in a territory as large as a state and outlines intended for use over still larger territory face a still more difficult problem. The outline must fit the need.

The problem of a rural teacher with little or no supervision and many classes to teach with comparatively little training or experience is different from that of the teacher of a group of selected children, with reasonable supervision to help in emergency, and adequate experience and training. This does not imply by any means that all city teaching is good and all rural teaching bad, since a good teacher with the freedom of the rural situation has advantages, which the same teacher, in a thoroughly but poorly supervised city system would not have. It is hoped that this outline may be useful to all, though it will have to be modified to meet the needs of any one locality.

A certain California city organizes its work on the basis that all children of the approximately three hundred schools concerned receive each week instruction on a common topic. Help in developing this topic is supplied in the form of a printed pamphlet from which the teacher may make adaptations to fit the particular grades. The children of all grades are, however, concerned primarily with a common topic of study at a given time.

In a certain Pennsylvania city, the children of a given grade emphasize in their work during the year, work on birds. Another year the same children may study mammals; another, wild flowers;

another, trees and so on. In accordance with this system, each grade of a given school building will be placing emphasis on a different field of information in science. This must complicate the task of any one individual supplying material for classroom study but may offer advantages in other lines.

Of these two systems, it should be obvious that so far as organization is concerned, the former would be more easily adapted to a state-wide or nation-wide basis where there will be approximately as many teachers who are teaching many grades as there are teachers who are teaching but one grade. Such a program applied literally on a state-wide or nation-wide basis would, however, raise the objections of those who insist that each year there be something accomplished which may be measured in order that progress may be determined. It is suggested that, from a purely mechanical viewpoint, this objection may be overcome by emphasizing in given years different aspects of all forms of nature studied whether they be birds or mammals or fish or insects. Some such recognition is made in the following outline, the problem of migration for example being emphasized in the fifth and sixth grades.

Returns from a very large number of school people indicate that in many programs there is too little time allotted to make any adequate progress in nature work. An attempt has been made to overcome this objection by grouping two grades and letting a child spend twice the time he would in a crowded program on a given topic. This is done by grouping the grades into first and second, third and fourth and fifth and sixth and suggesting work which will be considered in alternate years. This of course permits double the time allotment on a given topic whatever that time allotment may be and helps that much at least. For convenience in the following outline, one may choose to present the work printed on odd numbered pages on odd numbered years and treating the even numbered pages correspondingly. Recognition of this grouping arrangement appears in an outline which has been in use in New York State for a number of years. It also appears in an Illinois and a West Virginia state outline published subsequent to the New York outline. A majority of the state outlines make no recognition of the problems of the rural and small town teacher and many do it only on the title page.

The present outline permits the rural teacher to teach all grades with a single preparation and permits the city supervisor to travel without a truck, and teachers of one room to share useful material with teachers of another without in any way interfering with the work scheduled for accomplishment.

There has been an attempt in the present outline to increase the time allotment automatically by showing repeatedly how nature work may be used in connection with subjects which may have become established by custom. This is not done with the least intention of depriving such subjects as language, geography, drawing or arithmetic of any time but in the hope that nature work may fulfill a function in enriching, enlivening and motivating those subjects which sometimes may need such treatment. If it succeeds in this, the benefits will be general.

It is hoped that this outline has succeeded in combining the desirable features of the other outlines examined in connection with the survey published in this book. The organization here followed was evolved in its essential details while the writer was working with the city and rural teachers of a mid-west state about ten years ago. It has, of course, been modified considerably since that time.

SUGGESTED USE OF THE FOLLOWING OUTLINE

The following outline may be used in various ways. It is hoped that there is sufficient variety in the major topics suggested at the top of each of the following pages to insure help for all teachers. The sections from the standpoint of materials are Inorganic Nature, Plant Study, Bird Study, Insects and Their Kin (invertebrates), and Mammals, Fish, Reptiles and Amphibians. It is assumed that a teacher will be able to know whether a topic introduced, possibly by a child, belonged in any one of these groups and to which group it belonged. By turning to each of these sections one will find an introductory page dealing with the subtitles considered under each and it is hoped that the appropriate title may be selected with reasonable accuracy. If, for example, a rabbit track were reported upon, the teacher could turn to the section on mammals and there find a major unit dealing with small mammals found living on or under the drier ground. It seems reasonable to expect that the proper selection might be made. On turning to this major unit one would find at, or near, the top of the page a number of suggested mammals among which would be mentioned the rabbit. Following the rabbit's name is given a *Nature Magazine* reference, such as " 8-5-289." This means that in Volume 8, Number 5, on page 289 of *Nature Magazine* will be found an article dealing with the rabbit and probably useful in connection with the problem in hand. Armed with the information in this article the teacher might be able to proceed with the lesson, if she could not do so without it. If *Nature Magazine* is not available additional references may be found in the general bibliography beginning on page 336.

If the teacher be a rural teacher, teaching many grades of children, there will be found on the page on which the rabbit's name appears suggestive material for use in any, or all, of the grades.

If the teacher be a teacher of any particular grade, appropriate material for that grade will also be found there. For the convenience of a teacher of any particular grade, it will be found that appropriate material for that grade will always be found on approximately the same place on any page of the outline. This should assist in preventing loss of time through hunting through material designed for other grades.

From the standpoint of the supervisor of all grades it is hoped that the grouping of material for all grades concerned with a common topic on a common page will be a convenience. Those supervisors who desire to determine whether children have made progress during a year will find that there are many aspects common to the suggestions appearing under the various topics appropriate for a given grade. Other aspects appear as common to the suggestions under the various topics for other grades.

It is hoped that in the use of the outline the teacher or supervisor will attempt to present material or experiences sufficiently varied so that during the year a child will have experience with each of the major topics suggested. This does not mean that in some lessons more than one topic cannot be taken, or that but one lesson should be given to a topic. This will vary largely with the community in which the work is done. In a number of cases, optional major topics are suggested such as those dealing with marine life and those dealing with zoo animals. Where marine life or zoos do not enter into the child's natural experience, they may be omitted and where they do so enter, they should of course be included.

Suggestions for a topic for class work may come from the teacher or from the pupils of any grade. When the teacher or the class has agreed upon a subject, suggestion for material for use by any grade of child should be easily found. It may be found that where children in the upper grades have not had the preliminary experiences suggested for the lower grades that all can begin with profit with material suggested for the earlier grades and work up to that suggested as appropriate for the pertinent grade.

While the major references given for help in developing any topic are to articles in *Nature Magazine* suggestions have been made for additional source material. Reference to the Nature Books section following the outline may be useful where the *Nature Magazine* references are inadequate. As suggested previously, the present outline is a slight modification of a similar outline which has been in use in many schools of New York State for the last nine years. Much of the material appearing in this state outline has been reprinted, and appears in " The Fieldbook of Nature Study," published by the Comstock Publishing Company, Ithaca, N. Y. This includes in the neighborhood of five hundred life histories of plant and animal life similar to those given for birds in *Nature Magazine,* 7-5-306, also 7-4-240 on woody plants. The range of subjects covered includes mammals, birds, fish, reptiles, amphibia, insects, general invertebrates, water life, trees and shrubs and wild and cultivated herbs. In addition to the life histories given, there are plates of drawings for use in identification of the forms considered, a classroom outline and cut-out devices for little children. The life history material given covers such points as are concerned with identification, distribution, culture, habits and economic values of the forms considered all presented in chart form, with line drawings to assist in identification.

SEASONAL SUGGESTIONS

While it is not the purpose of this outline to arbitrarily suggest that any particular topics be given particular consideration at a particular time of year, experience has shown that teachers appreciate some suggested seasonal outline. Accordingly, the following is given with the hope that teachers may be able to pick from the general outline illustrative material to elaborate upon the topics mentioned here. For convenience, the months are given to begin with September which marks the usual beginning of the school year. *Nature Magazine* references are given immediately following each month. These refer to articles written particularly for use in the pertinent month.

September, 2-2-107; 4-3-131, 150; 6-3-133; 8-3-135, 158; 10-3-145, 190; 12-3-147, 184; 14-3-137. The problem of food storage confronts most forms of nature at this time of year. Woody plants have, or are "setting," their wood in preparation for winter. Plants are storing food in seeds, stems, fruits and roots. Mammals are storing it variously. Study these problems.

October. 4-4-195, 220; 6-4-199; 8-4-241, 199; 10-4-215, 257; 12-4-215; 14-4-201; 14-5-265. Color reigns supreme in this month. Sunsets are most beautiful. Leaves blaze with autumn shades—and then fall. With forests stripped, wild animals would be exposed, but for protective colors and patterns. Rabbits crouch unseen in the open. How do they and fish and insects remain unseen?

November. 2-5-273; 4-5-259, 278; 6-5-296; 8-5-263, 305; 10-5-279, 324; 12-5-287, 329. Self preservation from all sorts of enemies is the key-note which may here be considered. Do creatures save themselves by speed, aggressiveness, cunning, hiding, by force of their enormous numbers or by just pure luck? Think about this and check your thoughts with what you see.

December. 2-6-368; 4-6-323, 340; 6-6-327; 8-6-327, 368; 10-5-301; 10-6-349, 394, 382, 386; 12-6-355, 390; 15-1-16. Many forms of life begin or are in an inactive state during December. Make a study of the various ways living things are spending the winter. Not all insects spend it in the same way, nor do all mammals, all birds or all amphibia or all reptilia. Here is food for thought and observation.

January. 5-1-3, 45; 7-1-5, 49; 9-1-7, 39; 11-1-8a, 33, 50; 12-6-392; 13-1-9; 15-1-47. At night, the winter skies show us myriads of places in the universe other than the earth that we see by day. Our vision is extended and our experience may also be if we take up star study during this month of clear skies and brilliant stars. It is that way if it isn't cloudy.

February. 1-2-42, 29; 7-2-71, 109; 9-2-71, 116; 11-2-79, 118; 11-3-190; 13-2-75; 15-2-111, 117. In many parts of the country, a severe February will eliminate many weak individuals. Uncertain weather destroys buds that start too soon, birds that return north too soon, and even makes those humans who shed winter clothes too soon, suffer. The early bird may get the worm, but also a cold.

March. 1-3-20; 7-3-135, 176; 9-3-141, 184; 11-3-147, 185; 13-3-145; 15-3-179. With March, there is reason to expect that the work of the year begins in earnest. Humans are not the only living things that look strange when they wake up. Watch tree buds open, spring flowers burst into bloom, insects and frogs and snakes crawl out of hiding and stretch themselves, if they do such things.

April. 1-4-41; 5-4-209; 7-4-201, 235; 9-4-209, 233; 11-4-219, 257; 13-4-217;

15-4-215, 251, 257. A very large number of living things that can do so, begin the annual parade to their breeding ground in April or are on their way there. Frogs, birds, mammals and fish move long or short distances by whatever their means of locomotion may be. Study migration in April.

May. 1-5-5, 51, 56; 3-5-266; 5-5-275; 7-5-265, 303; 9-5-277, 307; 11-5-287, 330; 15-5-328. Many living things will have young to care for in May or are building homes for their young. The duties of home and of parental care hold a universal interest whether it is the home life of some birds or nest-building fishes or den-protecting mammals or a bumble bee's nest.

June. 1-6-25, 37, 42; 3-6-302; 5-6-341; 7-6-333, 374; 9-6-347, 379; 11-6-355, 397; 13-6-361; 15-6-395. In order that all forms of life may have room to live, some must give way to others. A balance is struck whether it is over the matter of food, of water supply, of air or of home sites. Few things are more interesting in nature than recognition of the balance which exists between forms.

July. 2-1-40; 4-1-3, 16; 6-1-3; 8-1-7, 42; 10-1-9, 51; 12-1-11, 54, 56; 14-1-9. July is a month of work but for children one of play. Play is not, however, limited to children but is indulged in by most living things to some extent. School may not be in session in July though children may be learning in camps. Where occasion permits, study how living things play.

August. 2-2-107; 4-2-90; 6-2-67; 8-2-71, 100; 10-2-77, 116; 12-2-79, 124; 14-2-73. Birds rest after moulting and rearing their families. Humans let down for a vacation. Recuperation is attained by many means, a change of scenery, sleep or other means are employed. While you are recuperating look around and see how others are doing the same thing—if they are.

THE PROBLEM OF METHOD

The problem of method is handled largely under each of the headings appearing on subsequent pages, but there are some points of method, reference to which may be appropriate here. Among the general references on method in nature work the following in *Nature Magazine* may be found useful: 3-1-4; 4-1-44; 4-2-116; 4-3-178; 4-4-245; 4-5-306; 6-1-47; 6-4-241; 7-5-296; 8-2-108; 8-3-174, 175; 9-1-58; 10-3-196; 10-4-261; 11-1-52, 56; 11-2-122, 129; 11-3-190; 11-4-255, 259; 11-6-396; 12-1-58, 59; 12-2-128; 13-5-291, 295; 14-1-19; 14-2-92; 14-4-222; 14-5-300; 15-2-125; 15-3-198.

Camp activities, nature maps, trails and travels useful in schools are to be found in these references. *Nature Maps,* 10-1-20, 58; 13-5-290; 15-5-308. *Camp activities,* 10-1-27, 58; 11-1-52; 11-2-104; 11-3-174; 11-4-255; 11-5-322; 11-6-382; 15-6-403. *Nature travels and vacations,* 10-1-21, 27, 35; 10-2-84, 112; 10-4-253; 10-6-370; 11-6-364; 12-1-30; 12-2-122; 13-1-39; 13-5-304, 322; 13-6-363, 388; 14-1-29; 15-1-11, 29, 51; 15-2-75, 89, 97; 15-3-153; 15-4-245, 270; 15-5-289, 297; 15-6-363, 379, 387. *Nature trails,* 10-1-58; 10-2-119; 11-4-255; 12-2-122; 15-4-265. The following additional articles may be found useful: 1-3-45; 3-4-225; 4-2-105; 5-4-244; 5-5-283; 5-6-379; 7-4-231; 7-6-356.

There may be some who care to introduce the spirit of games into their nature instruction. These references may help here: *Nature games,* 10-2-127; 11-6-396.

It is hoped that the puzzles in the magazine, 5-3-186; 5-4-250; 5-5-318;

5-6-382; 6-1-50; 6-2-116; 10-1-30; 10-2-111; 10-3-194; 10-5-323; 10-6-364; 11-1-26; 12-1-59 will prove worth while.

Some may feel that photography offers a channel through which nature may be studied with profit. If so, see these references in *Nature Magazine*: 1-3-3; 1-4-25; 1-5-9, 19; 1-6-15; 2-2-87; 2-4-206; 2-6-352; 3-1-36; 3-2-95; 3-3-138; 3-6-325; 6-2-105; 6-6-371; 8-4-205; 8-6-388; 10-2-130; 10-3-175; 11-1-9, 41; 11-2-88, 113; 11-3-149, 153, 168; 11-4-239, 244; 11-5-310, 320; 11-6-368, 371, 380; 12-1-42; 12-2-106; 12-3-149; 12-5-333; 13-1-51, 63; 13-6-401; 14-1-28, 34; 14-4-211; 15-1-19, 52; 15-2-75, 106; 15-3-141, 161; 15-4-223, 262; 15-5-324; 15-6-363.

Interest in wild life may be encouraged through an understanding of the wild life sanctuary idea using these references: 2-3-139; 3-4-227; 5-2-113, 114, 117; 5-4-241; 5-5-307; 7-5-305; 10-1-67; 10-2-131; 10-4-264; 10-5-293; 11-3-174, 196; 12-4-236; 12-6-374; 13-2-117; 13-4-227; 13-5-315; 14-1-46; 14-2-120, 121; 14-4-203, 215; 14-6-329; 15-3-192; 15-4-213, 260; 15-5-325, 332; 15-6-357.

Nature clubs are also useful organizations in connection with fostering work. Useful references in the magazine in connection with this phase of the work are: 3-2-112; 3-5-279, 303; 3-6-353; 4-2-110; 8-2-118; 9-1-43; 9-3-196; 9-4-262; 10-1-69, 67; 12-4-262; 15-1-52, 58, 60; 15-2-99.

Clubs may be interested in exhibits and campaigns and the like. If so, the contest in defense of the beauty of bird songs might be easily made a local affair. Nature Magazine presented this contest and gave a summary of it on 9-1-48. Other contests might be conducted between groups submitting evidence that they had found more about the value of touch to nature. An introductory article to such an activity may be found on 8-6-332 of *Nature Magazine*. Introductory articles for similar activities along slightly different lines may be found in the following: sound, 7-5-279; thrift, 7-1-53; instinct and intelligence in nature, 2-2-103; color, 8-3-141; scent, 7-3-153; man and native ingenuity, 8-4-229. These additional articles may be helpful channels along which competitions may be held, if this is to be desired, and if emphasis is placed upon the competitors finding for themselves in nature additional material interesting in understanding and appreciating the idea outlined: 10-1-27, 56, 69; 10-2-128; 10-3-153; 10-4-206; 10-6-396; 11-2-104, 105, 108; 12-3-173; 12-4-224; 13-4-240, 255; 15-1-51, 52, 58, 63; 15-2-126, 130; 15-3-170, 193, 199; 15-4-261; 15-5-310; 15-6-387.

A complete appreciation of any sort of study cannot be gained without some peek behind the curtains at some of those who have been identified with furthering the movement. To help in this connection these biographical sketches may be useful: Akeley, 10-6-387; Bailey, Vernon, 14-4-229; Baird, 9-2-101; Borland, 10-2-126; Burroughs, 9-6-369; 15-4-231; Chestnut, 15-3-178; Coues, 8-3-181; Darwin, 9-5-319; Fabre, 14-3-166; Fuertes, 12-3-177; Gray, 8-5-303; Haweis, 11-3-172; Howard, 10-6-405, 15-3-176; Jones, 13-3-152; Lamarck, 8-2-109; Lampman, 11-4-224; Lewis, 11-3-186; Marsh, 8-4-239; Mather, 15-3-202; Michaux, 10-4-259; Muir, 10-5-315; Nuttall, 9-1-37; Pasteur, 8-6-346; Pickwell, 12-2-91; Sharp, 11-2-84, 15-3-203; Thoreau, 10-1-53; White, 13-6-384.

It is admitted that the material presented on these two pages does not adequately cover the field. It is felt that most readers of this book, however, will be familiar with Nature Magazine and can from its columns get added help.

Other suggestions as to method may be found in the references in the book on pages 339-342.

INORGANIC NATURE

While examination of the topics here considered is useful in interpreting some of the behaviors of plants and animals, this need not precede the study of plants and animals but may be brought in to assist in interpreting their behavior. While from the standpoint of an adult it may be logical to begin with the sun and show how it is largely responsible for the variations in our atmosphere, which give us with the help of gravity what we call weather, it is no sign that a child should come into knowledge about the world in which he lives through the same door.

The major topics here presented are sufficiently comprehensive to permit of considerable subdivision, if this is desired. Much of the experience suggested here will be introductory to work in physics and chemistry, if it does not actually become elementary physics and chemistry. The work on land forms and on rocks, soils and minerals may be a part of geography itself or it may be interpretive of what may be considered as geography. It is essential in the nature work, however, that these experiences be gained primarily from the immediate environment, while apparently this is not always so in geography. There are some leaders in nature education who contend that anything outside of the immediate environment should not be considered as a part of what they may prefer to call nature study. The problem of course, is not one of definition of terms but rather of providing the youngsters with experiences which will be useful to them from their own viewpoint as well as from the viewpoint of adults. None of us cares through what particular channels these are secured.

It is hoped that it may be recognized that the sun by its varying heat and light produces temperature changes which affect our atmosphere and help produce our weather; that these temperature changes at other degrees than those which we can experience may have been partly responsible for the nature of our rocks, which in turn may have produced our soils. These rocks and soils with our weather have been responsible for our hills and our valleys, our lakes and our rivers. In a big comprehensive sense these make up our earth which is a part of the solar system. This in turn is a part of the universe.

The references in this book on pages 339 to 348 and 378 to 382 should prove useful in connection with this section.

The Seasons, The Sun and Its Family

Nature Magazine References.—Planets, 6-1-43; 6-6-361; Mars, 12-2-126; Mars occultation, 12-5-329; Saturn, 14-3-179; Venus, 12-2-126; 13-2-118; eclipse, Sun, 5-1-45; 15-4-251; eclipse, Moon, 12-5-329; 15-4-251; climate, 8-1-25; sunrise, dawn and twilight, 8-2-73; rainbows, 8-3-144; Sun, planetesimal theory; 14-1-53; 14-2-114; moonlight near poles, 12-3-186. *General References.*—Pages 339-348; 378-382.

Suggestions for First and Second Grades.—Some recognition of the sun as being responsible for the daily and yearly seasons and a recognition of the characteristics of those seasons may be made in these grades. Recognize the differences in the appearance of the moon during a month, and notice that sunsets and sunrises do not appear at the same place and that they may tend to be different at different times of the year. The effect of change of seasons on plants and animals is further elaborated under the seasonal outline given previously. The calendar given on the first pages of this book should also prove helpful in making suggestions for use in these grades.

Suggestions for Third and Fourth Grades.—A more thorough knowledge of why the moon looks different at different times of the month may be made available. The making of sun dials and the use of shadow sticks in connection with season studies are worth while, particularly if they are accompanied with exercises on temperature reading which will show the relationship between the presence of sunlight and temperature. The relative length of days during the seasons may be made a matter of class record with profit, though this may be reserved for work in the higher classes. Some experience in the realm of the behavior of heat where the heat may be controlled would be worth while in understanding problems in climate mentioned elsewhere.

Suggestions for Fifth and Sixth Grades.—The story not only of the moon and its relation to us and possibly in relation to tides, but also the story of our relation to the sun may be given briefly. This might bring into consideration the other planets that make up the sun's family and help explain " morning stars " and " evening stars." Some suggestions as to what is meant by the " Signs of the Zodiac " might be given. This is splendidly explained in Mrs. Comstock's " Handbook of Nature Study."

The Atmosphere and Weather

Nature Magazine References.—Atmosphere: Air and dust, 5-6-353; air of the forest, 10-4-245; aurora and the upper atmosphere, 8-6-340; mirage, 7-1-39; rainbows, 8-3-144. *Water:* Dew, frost and snow, 2-4-227; 4-5-268; foam, frozen, 7-3-144; Gulf Stream, 15-2-89; hail, 4-4-197; ice, 5-1-15; Mississippi flood, 10-1-31; rain for drinking, 7-1-54; snowfall and farming, 13-3-162; snowflakes, 15-1-19; water, clouds, 5-2-95; 7-6-343; 9-6-357. *Weather:* Air, storms, 6-5-269; California weather, 12-4-217; ice storms, 9-3-147; lightning, 6-1-21; 9-5-309; measuring weather, 11-1-23; nature's own weather bureau, 12-5-352; tornadoes, 3-3-147; weather, 3-5-291; weather recorded by trees, 12-1-51; wind and weather at sea, 9-1-17; wind erosion, 7-5-287; 9-2-95; winds, 5-3-153. *General References.*—Pages 339-348; 379, 380.

Suggestions for First and Second Grades.—It seems justly to be a rather well established custom for early grade children to keep some record of the weather, indicating on a calendar windy weather by pictures of ruined umbrellas, rainy weather by representations of driving rain and so on. This is worth while since it forms basic experience for appreciating that air has among other things, weight, in order that it may be able to ruin the umbrella. Any experience which will fix in the minds the relationship between weather and temperature, the recognition of different kinds of weather, possibly by means of the most obvious clouds, will be worth while activity.

Suggestions for Third and Fourth Grades.—The simplest appreciation of what the atmosphere is made of and the simplest explanations of winds, storms, tornadoes, and the like may be given. Merely have it understood that though they may not comprehend how these things come about, most of these things happen for reasons which may or may not be controlled. The local effect of winds, the local climate and the general local water supply may within limits be controlled by man.

Suggestions for Fifth and Sixth Grades.—The points raised above will stand elaboration here. The study of a weather map might be introduced, also seasonal study with the view of planning the time of planting gardens. Learn to trace water from clouds through its various forms and back to clouds again. Study the local water supply with the view of understanding how it might be improved and why it should receive protection.

Rocks, Soils and Minerals

Nature Magazine References.—Agates, 12-3-155; coal, 3-1-5; 15-5-329; forests and fertility, 10-5-317; forest, chalcedony, 7-1-29; general lesson, 2-6-364; lignite, 3-5-271; rock sanctuary, 14-3-174; stone hammer, 15-5-324; story of a rolling stone, 3-3-153. Many state colleges of agriculture supply soil maps of various portions of the states which may prove useful in connection with study of this sort. *General References.*—Pages 339-348; 378, 379.

Suggestions for First and Second Grade Children.—About as soon as the desire to collect begins to appear with children they make collections of various colored stones. About the same time they learn to write on stones with other stones and between these two experiences they may lay a basic experience for understanding the stories of various kinds of rocks. It is sufficient for children of these ages to recognize that there are a great variety of rocks that may be distinguished in part, at least, by their relative hardness and in part by the color, weight, luster and other characteristics which are easily evident from a superficial examination. In addition to studying rocks, children of these ages make a beginning at soils study when they make mud pies. Not all kinds of soil will make good pies, and certain things added to an otherwise mediocre soil will make inferior or superior pies. These experiences may be most useful in the study of soils in gardens or farms later on.

Suggestions for Third and Fourth Grades.—Recognition of the kinds of material which go to make up a good soil in which to grow plants may be a useful line of thought for these children. The briefest understanding of how coal has been formed would be appropriate and in certain parts of the country the recognition of mineral bearing rocks is suggested.

Suggestions for Fifth and Sixth Grades.—The whole story of making good soil, at least for garden purposes, should be introduced. This will involve some understanding of capillarity and water supply, some understanding of the value of lime in keeping soil in condition and some understanding of why it is profitable to cultivate soil. In some regions it might be worth while to recognize soils that are " sour " from those that are not. Mineral and rock study may be elaborated as the local demands warrant. This whole section might be conveniently split into at least three worth while sections.

Land Forms and Physical Geography

Nature Magazine References.—Buried forests, 2-2-124; Carlsbad cave, 10-6-370; caves, ice, 7-6-347; dunes, sand, 7-2-101; 15-5-329; earth core, 12-6-385; earthquake, 9-5-283; erosion, 1-1-50; 10-3-198; Florida Keys, 15-1-33; floods, 5-4-228; forests and lava, 11-3-177; glacial records, 5-4-223; glaciers, 15-6-379; Gulf Stream, 15-2-89; lake, boiling, 7-2-89; levees and floods, 10-1-31; 11-1-48; mud rivers, 10-3-317; natural bridge rainbow, 14-5-267; prairies, 7-2-84; South Dakota Palisades, 14-2-109; springs of Florida, 14-6-369; swamps. bogs and marshes, 11-2-109; topographical changes, 15-5-329; volcano, 4-2-96: 8-4-211; waterfalls, 10-2-84. Most of the general articles and articles of travel give other suggestions useful in the study of land forms. Study local government topographic maps. *General References.*—Pages 339-348; 378, 379.

Suggestions for First and Second Grades.—Those who contend that 1st and 2nd grade youngsters are not capable of taking lessons in this field should merely watch children of this age playing in brooks and gutters. They are constantly either damming up the streams to make pools or removing obstructions to allow the water to flow freely. An appreciation of the simplest sort of what water is able to do in carrying snow and dirt down gutters may be the opening step to an appreciation of why we have hills and valleys and the variety which we find in the kinds of soil over which we move daily, no matter where we live. The whole story is generally being demonstrated in the gutter or brook where the child plays.

Suggestions for Third and Fourth Grades.—Recognition of examples of the many land forms frequently called for in geography may be made from similar land forms in brooks. Recognition that the ice and snow on a school roof functions much as a glacier and leaves a glacial deposit under the eaves if the water is not piped away. It may be recognized that gravity is the controlling factor in the whole controversy between erosion and deposition, though this need not necessarily be explained or understood in detail.

Suggestions for Fifth and Sixth Grades.—Some experimentation with the forces that have been acting in making our land forms is worthy. This may lead to an appreciation of how we may use these forces for commercial purposes by harnessing our waterpower. It may lead to the recognition of the fact that parts of our country which apparently have no value agriculturally have an even greater value from the standpoint of power generation. The story back of floods and deforestation should be given due prominence.

Sky Study

Nature Magazine References.—General Studies: Celestial sphere, 13-1-54; 15-2-111; center of the universe, 14-4-241; comets, 11-6-397; Florida skies, 14-6-372; meteors, 12-5-329; 13-4-258; mysteries of the skies, 15-1-47; nebular hypothesis, 13-6-404; observatories, California, 12-4-253; observatories, New England's fifteen, 13-5-336; 15-3-179; sky study in different lands, 11-5-330; stellar yardsticks, 14-5-304; telescopes, 13-3-182; twenty brightest stars, 12-6-392; zodiac, 11-3-185; zodiacal light, 11-4-257. *Constellations and Stars:* Aquarius, 10-5-324; Aquila, 10-3-190; Aries, 10-6-394; Auriga, 9-2-118; Boötes, 5-6-377; 9-4-251; Cancer, 7-3-170; Capricornus, 10-4-257; Cassiopeia, 8-6-365; Cygnus, 8-2-111; Draco, 8-3-175; Gemmi, 9-3-181; Hercules, 10-1-51; Hyades, 2-6-361; Hydra, 7-5-308; Mira, 5-5-315; Milky Way, 6-2-113; Northern Cross, 6-3-172; Ophiucus, 12-1-56; Orion, 3-1-17; 9-1-46; Pegasus, 8-4-243; Perseus, 8-5-307; Pleiades, 2-6-361; 11-1-50; Sagittarius, 10-2-116; Serpens, 12-1-56; Sirius, 11-2-118; Taurus, 7-1-46; Ursa Major, 3-5-266; Virgo, 3-6-352. *Skies by the months:* January, 5-1-45, 7-1-46, 9-1-46; February, 5-2-104, 7-2-104, 9-2-118; March, 5-3-167, 7-3-171, 9-3-181; April, 5-4-247, 7-4-237, 9-4-251; May, 5-5-315, 7-5-308, 9-5-311; June, 5-6-377, 7-6-372; 9-6-382; July, 4-1-16, 6-1-43, 8-1-46; August, 4-2-90, 6-2-113, 8-2-111; September, 4-3-150, 6-3-172, 8-3-175; October, 4-4-220, 6-4-237, 8-4-243; November, 4-5-278, 6-5-296, 8-5-307: December, 4-6-340, 6-6-361, 8-6-365. *General References.*—Pages 339-348; 380-382.

Suggestions for First to Fourth Grades.—Star and constellation study seems to have varying success in various communities. In some places it seems to hold a leading place in nature work and in others it is practically eliminated. Obviously it should hold a place intermediate between these two viewpoints. Views differ also as to the advisability of teaching the myths connected with the constellations, some contending that it is misleading and a waste of time and others that it has a worthwhile cultural value. Whatever the views may be, it seems reasonable to ask that a child know something of the nature of what he sees in the skies above, particularly at night.

Suggestions for Fifth and Sixth Grades.—Star study for these grades may evolve itself into those useful angles which include ability to locate north by them and possibly even some ability to tell the time of night by them, though this may be too difficult. Certainly star study should be given in these grades in connection with geography, not only for the purpose of orientating the position of our earth in the universe but also from the standpoint of appreciating how small a part of the universe man really is.

PLANT STUDY IN GENERAL

Gardening and Non-Woody Plants

Nature Magazine References.—Gardening, 1-2-42; 1-3-52; 1-3-53; 1-4-39; 1-5-56; 1-6-42; 9-1-44; 9-2-90; 9-3-166; 9-3-167; 9-4-218; 9-6-377; 9-6-389; 10-1-40; 10-2-118; 10-3-189; 10-4-244; 10-5-300; 10-6-392; 11-1-54; 11-2-120; 11-3-188; 11-4-260; 11-5-324; 11-6-390; 12-1-54; 12-2-124; 12-3-184; 12-5-320; 12-6-390; 13-6-407; 14-1-55; 14-2-122; 14-3-185; 14-4-247; 14-6-385; 15-1-49; 15-1-55; 15-2-117; 15-3-159; 15-4-235, 248; 15-4-257, 266, 267; 15-5-319; 15-5-333; 15-6-399; California gardens, 12-4-231; camp gardens, 11-5-322; Florida gardens, 14-6-366 garden psychology, 12-6-382; memory gardens, 10-2-119; rock gardens, 14-3-161; 15-5-319; school garden, 11-5-326; wild flower gardens, 10-2-119; 11-4-225; 11-5-322; 13-6-375; 14-3-163; air plants, 15-3-173; 15-4-248; bulbs, 10-4-222; 12-6-407; 15-1-49; 15-2-114; 15-3-185; color in flowers, 15-4-266; diseases, 15-4-235; 15-6-377; flowers of the Lake States, 15-5-305; hybrids and pure races, 10-1-47; insect pests, 10-1-17; 12-2-117; 13-6-393; landscaping, 10-6-365; leaf-prints, 2-3-143; narcissus bulb-fly, 12-2-117; plant growth and cold weather, 1-3-36; plant inspection, 1-1-26; plant propagation, 11-3-188; plant protection, 1-5-35 (see also ornamental herbs); publicity on conservation, 3-3-166; plant puzzles, 5-5-318; Puritan posies, 13-5-319; seed germination test, 12-3-172; soil for wild flowers, 11-4-225; tree friends, 15-6-391. These references, together with those given on the next few pages, should adequately cover the field of plant study in the elementary schools. *General References.*—Pages 339-348; 366-373.

Unquestionably there will be those who will differ with the judgment of the author in the selection of the topics given as headings on the next few pages. The contributions of animal life to man are in the realm of protecting plant life or injuring it, or in the realm of furnishing food, shelter and enjoyment to man. Plant life's contributions are much the same, except that the food contributions fill much more varied needs than is the case with animals. It was felt, then, that there was some legitimate reason for recognizing the groups of plants that contribute the various types of food necessary to a diet, and in addition considering plants which furnish us with other types of things than food. There will probably be some difference of opinion as to a few inclusions under various headings but the point to be gained is that our interest should not be so much in identifying plants, in pulling them to pieces and naming their parts, but in recognizing the service which they perform for us. It is hoped that each child may have some acquaintance with some one of the plants included under each of the major topics suggested and that this experience may be renewed at least every other year, preferably at least once a year through the first six years of school life.

Forestry and Woody Plants

Nature Magazine References.—Banana trees, 12-5-311; California trees, 12-4-248; 12-4-256; catkins of spring, 5-3-182; chestnut, vanishing, 10-3-167; Christmas greens and trees, 2-6-329; 3-1-40; 4-6-325; 4-6-351; 6-6-337; 6-6-357; 8-5-295; 8-6-350; 10-5-301; 10-6-382, 386; 15-1-16; climate and forests, 10-4-245; climate and trees, 12-1-51; conservation, 15-1-44; 15-2-101; 15-6-367; demonstration forest, Pack, 10-1-21; desert plants, 3-4-234; elm tree, 15-1-28; flood protection, 11-1-48; Florida trees and forests, 14-6-350, 361, 373; 15-3-173; forestry, 10-5-326; 13-3-161; forestry as a profession, 1-2-37; 4-4-221; forestry education, 8-1-44; forestry and chemistry, 8-3-168; forestry and general reforestation, 1-1-35; 2-1-51; 2-2-84; 2-3-149; 2-5-271; 2-6-339; 3-1-27; 3-2-99; 3-4-230; 4-1-36; 4-5-296. 301; 5-2-82; 6-1-34; 6-4-233; 6-5-301; 7-1-36; 8-3-183; 8-4-248; 9-1-5; 9-2-120; 9-5-314; 9-6-385; forests and fertility, 10-5-317; forest fires, 2-1-21; 4-3-159; 6-2-86; 8-1-49; 10-3-153; 12-2-87, 114; 14-1-37; forests and lava, 11-3-177; fossil trees, 10-5-299; 13-2-105; fruit trees, subtropical, 12-5-311; 12-6-389; 14-6-350; fungi and forests, 13-1-40; insects and forests, 5-5-311; landscaping, 3-4-209; 9-4-230; lumber in the home, 10-6-401; 15-3-173; maple, 15-4-218; National Arboretum, 13-4-227; New England forests, 13-5-330; nut trees, 11-2-126; oaks, aged, 11-4-251; 14-2-116; orange, 15-4-267; papaw, 12-6-389; redwoods, 12-4-240; roadside forests, 13-3-175; rubber, 6-2-91; tannin, 4-2-87; trees as citizens, 1-2-62; character of trees, 7-3-165; trees guarding graves, 2-6-349; trees and highways, 3-2-102; how trees grow, 1-3-55; 9-3-177; how to plant trees, 3-3-164; 5-3-176; 9-4-247; tree leaves, 4-4-242; 6-4-245; 6-5-299; 7-6-367; tree pageant, 4-5-305; 5-5-306; trees and Arbor Day, 1-1-22; 2-1-51; 2-4-249; teaching about trees, 2-5-299; tree seeds, 2-1-61; tree sounds, 4-3-177; tree leaves and leaf-prints, 2-3-143; 7-6-367; tree surgery, 7-2-106; 15-3-200; tree barks, 14-5-285; tree flowers, 11-4-230; tree murderer (fig vine), 11-2-87; trees as friends, 14-2-99; tropical trees, 10-2-107; tung oil trees, 12-6-364; twigs, 2-1-55; 7-4-219; vines and twists, 2-1-47; white pine, 15-5-310; wood in toys, 4-6-355; wood in sports, 4-1-27. In addition to the above references we should mention particularly "The Forestry Primer," published by the American Tree Association and the "Forestry Almanac," also published by that association, whose address is Washington, D. C. These with the other publications of that association should supply ample information and guidance for work on trees in schools. *General References.*—Pages 373-377.

The topics suggested above, taken with those given special consideration in the next few pages, will themselves serve as a guide to giving a proper appreciation of the significance of woody plants and how they may be satisfactorily used by civilization. Particular attention might well be given to the following subtitles on the following pages: Timber and pulp producing plants, fat and oil producing plants, ornamental woody plants, sugar producing plants.

Particular interest may become manifest in such topics as how woody plants grow, how woody plants may be successfully planted, how important a part woody plants play in our food, our shelter and even in generation of power which may be useful to us, the possible future of our wood supply and our part in its maintenance.

Sugar-producing Plants

Nature Magazine References.—Apple, 7-4-240; cacti, 15-2-99; century plant, 10-4-236; dates, 5-2-106; orange, 3-2-83; prune, 2-1-57; raspberry, red, 7-4-240; strawberry, 7-2-98; sugar beet, 3-6-338; sugar cane, 3-6-338; sugar maple, 1-3-17, 3-3-161. Ample information concerning apples, grapes, peaches, raspberries and other fruits that produce sugar that enters into our diet may be found in the publications of the United States Department of Agriculture and in the more complete nature study texts. *General References.*—Pages 366-377.

Suggestions for First and Second Grades.—Apparently it is difficult to keep first and second graders from sugar even though they may not find it in their school curriculum. Few children would argue that sugar in its many forms should not enter into their diet. An appropriate lesson might deal with an attempt to find through experience as many sources as possible from which we secure sugar. Children may be more successful than some adults in this. It might be well to point out that sugars come from both woody and herbaceous plants. The effect of sugars in preserving and also in connection with decay might be introduced, though it would probably be more appropriate in the higher grades.

Suggestions for the Third and Fourth Grades.—Further elaboration of some of the points raised above would be appropriate. It might be pointed out that fruits and plant parts that may be sweet at one time are not necessarily sweet at other times. This may point out some of the ways in which sugars behave. Simple experiments to show how starch is turned to sugar by the saliva may assist in appreciating the enormous extent to which we call upon sugars as food, and also help in developing intelligent habits in connection with eating.

Suggestions for Fifth and Sixth Grades.—The culture of sugar-producing plants in gardens and orchards should be understood in brief. Something should be understood of methods of extracting sugar and, possibly, something of the means by which men have been able to increase the sugar production of plants beyond any point of need of the plant itself. The storage of sugars and of other foods in plants should be known to exist even though it may not be understood.

Starch-producing Plants

Nature Magazine References.—Cat-tail, 2-1-36; 10-3-178; corn, 1-4-23; 2-4-237; 4-4-225; wild-rice, 15-3-198; 15-5-289; wheat, 1-1-24, 4-1-39, 4-1-42. Many firms producing foods and materials from cereals distribute abundant material of use in developing lessons in this field. This seems to be particularly true of corn products. Manufacturers of farm machinery and the United States Department of Agriculture issue bulletins which are very useful, if the local state agricultural college does not meet the needs through its bulletins dealing with cereals. *General References.*—Pages 339-348; 366-377.

Suggestions for First and Second Grades.—If we may believe the advertisements we read, cereals literally enter into the lives of many children of first and second grade age. A recognition of some one cereal plant, whether it be those listed above or some other, should enter into the child's school experience. Of course, in regions whose industries are concerned largely with cereal plants, this may seem unnecessary, but in other places it would not seem so much amiss. The child who thought milk came from an eagle she saw in the zoo had something lacking in her experience which might have been supplied in school. Starch production is of course not limited to cereals and this should be kept in mind by the teacher, though it may not appear definitely in the story. How potatoes grow is both interesting and practical.

Suggestions for Third and Fourth Grades.—Problems attendant upon the culture of starch-producing plants, either in a home or school garden, arise here. The testing of seeds for germination brings in a splendid correlation with arithmetic and number work. For help on this see *Farmers' Bulletin* of the United States Department of Agriculture, " Testing Seeds in the Home and Rural School."

Suggestions for Fifth and Sixth Grades.—The manuals in use by leaders of the 4H Clubs are probably the best guides for the study of cereals by children. If these are not available, the teacher may get desired information from elementary agriculture texts and adapt it to the needs of these children. The school garden is, of course, a most valuable laboratory in which to develop an understanding of the source of starchy foods. Some hint of the place of starchy foods in diet should be given.

Root Crops

Nature Magazine References.—Gardening, 1-2-42; 1-3-52, 53; 1-4-39; 1-5-56; 1-6-42; 9-1-44; 9-2-90; 9-3-166, 167; 9-4-218; arrowhead, 12-1-32; camas, 12-1-32; cat-tail, 10-3-178; ground nuts, 14-2-119; ipo, 14-3-171; peanuts, 10-3-181; sage-lily, 14-2-119. Seed catalogues and garden manuals will prove useful additional reference material. As a sideline see, 7-1-13. See also last references under sugar producers. *General References.*—Pages 366-373.

Suggestions for First and Second Grades.—The essential story of root crops lies in the fact that a part of their lives is devoted to storing up a conspicuous food supply, to be used later in the production of flowers, fruits, and seeds to start the story over again. This story enters into the experience of a little child when he visits a radish patch in the garden, and finds that radishes which were once tender and plump have become slender and tough. The same story is repeated by innumerable plants growing wild in nature, though not all plants store the food in the root system or in the underground parts. Recognition of this variable condition which exists in a few plants which may themselves be recognized would be more than ample accomplishment for children of these grades.

Suggestions for Third and Fourth Grades.—Experience gained in gardens with plants of this type should be ample. If not, it should be arranged that the annual, biennial and perennial nature of plants be appreciated in some way. It will be realized, of course, that the habit of conserving food and energy and then expending it is not necessarily limited to plants that require over a year to do it. The principle is the same if the period is but a few weeks. Plants which may be considered in this whole group are beets, radishes, carrots, turnips, and, aside from the main issue, such plants as onions, that store food in underground leaves, and potatoes that store it in underground stems.

Suggestions for Fifth and Sixth Grades.—The rôle played by root crops in supplying our diet with such foods as starches, sugars and mineral foods might be presented. The "Fieldbook of Nature Study" and other references present this matter concisely. The problems attendant upon storage of root crops for human use, of seed selection for improved quality, and similar problems may prove interesting, though of course not all of them should be attempted with a single group.

Fat- and Oil-producing Plants

Nature Magazine References.—Almond, 4-4-243; bay berry, 1-1-52; cacao, 8-3-177; cassina, 2-1-53; cocoanut palms, 5-3-161; eucalyptus, 7-4-240; oaks might possibly be considered here, 2-1-27; 2-2-112; 2-3-164; pine-nuts for food, 5-3-148; 8-3-157; peanuts, 10-3-181; tung oil trees, 12-6-364. *General References.*—Pages 339-348; 366-377.

Suggestions for First and Second Grades.—It is probable that as time goes on we will more and more look to plants as a source of fatty and oily foods. Already many of our butter substitutes are largely made from cocoanut oil and peanut oil. Even the fats in our soaps seem to be coming in an increasing extent from plant instead of from animal sources. For this reason it is appropriate that plants producing this type of material enter into the experience of little children. In the first grades this may and in many parts of the country probably will, limit itself primarily to nut bearing trees and shrubs. Indians formerly looked to the acorns as a source of food, though we do not do this at present. We still do eat pine seeds, as luxuries at least. The oils from many herbs as well as from woody plants enter children's experience, too, sometimes with opposition, as in the case of castor oil. Plant oils are frequently used as machine lubricants, being more satisfactory for some purposes than mineral oils.

Suggestions for Third and Fourth Grades.—Enough issues were raised in the above section to supply material for use in these grades. Simple tests for the recognition of the difference between oily and starchy foods, such as the effect of oils upon paper may be offered. The simplest means of extracting these oils may be suggested and demonstrated.

Suggestions for Fifth and Sixth Grades.—The relative food values of starches, sugars and oils is worthy of consideration. This is not infrequently reflected in the cost of materials producing these things and the frequent adulteration of superior with inferior materials. Suggestions should also be brought out as to the parts of the earth at present producing the great bulk of plant oils, with the optimistic outlook that with reasonable development, the tropics may produce practically indefinite amounts for the many uses that have been found for oils.

Garden Truck, Particularly Green Food and Legumes

Nature Magazine References.—Gardening, 1-2-42; 1-3-52, 53; 1-4-39; 1-5-56; 1-6-42; 9-1-44; 9-2-90; 9-3-166, 167; 9-4-218; savage gardens, 12-1-32. Seed catalogues, garden manuals, the "Fieldbook of Nature Study," and many other references will be useful in connection with this field of study. *General References.*—Pages 339-348; 366-373.

Suggestions for First and Second Grades.—While these children need not be concerned with a study of the plants here considered as contributing vitamins and protein foods to our diets, it is legitimate to be sure that they form an acquaintance with the plants which make those contributions, which they may later be able to appreciate. Little children may be more concerned with planting their gardens with pretty flowers, and if this is so, all well and good. If not, try to introduce them to at least some one legume, such as peas, beans, alfalfa or the clovers, and to at least one plant that produces food of the salad type, such as lettuce, celery, spinach and the like. Spinach unquestionably enters into the diet of first graders, why not, then, into their school experience? Mere recognition of the plants may be ample here.

Suggestions for Third and Fourth Grades.—If possible, carry on a garden, either as a home or school garden, or if not, then in a window box in the schoolroom. Egg shells have been used most successfully as gardens in the most congested of city districts, so wherever there are earth, air, warmth and moisture, seeds and a place to hold plants in the sunlight, a garden of a type may be carried on. The needs of a good garden may well be the typical activity for children of this group.

Suggestions for Fifth and Sixth Grades.—An appreciation of the work done by legumes in the fixation of nitrogen and the consequent enrichment of the soil should be introduced, at least. This involves or brings up the problem of maintaining fertility of soil. Activities begun in the earlier grades may be continued with profit. Some appreciation of the value of vitamins in green foods as body regulators and of protein foods such as come from legumes may well be presented.

Poisonous Plants and Medicinal Plants

Nature Magazine References.—General, 1-1-20; 5-1-42; 14-1-16; Bergamot, 1-2-58; nightshade, 8-1-33; 14-1-16; poison ivy, 2-3-147, 4-2-119; poison sumac, 8-4-237; pokeweed berries, 14-1-16; privet berries, 14-1-16; tobacco, 4-3-151; white snakeroot, 11-6-385, 14-1-16. The United States Department of Agriculture issues a number of useful bulletins relating to plants of this type. See also "Parasitic Plants" section. *General References.*—Pages 339-348; 366-377.

Suggestions for First and Second Grades.—There are certain plants which must not be touched or eaten by human beings, and while it is poor pedagogy, possibly, to tell a child what should not be done, there may be communities where this is essential to his own happiness. Where poisonous plants would not naturally come into the child's experience, consideration of the problem might well be reserved until higher grades. Where certain of these plants do abound and appear to be attractive, it is only kindness to teach that they should be avoided. What these plants may be will, of course, vary with the locality. In some places it may be poison ivy or poison oak. In others it may be poisonous toadstools. In a third it may be attractive but poisonous juicy-fruited plants.

Suggestions for Third and Fourth Grades.—The effect of poisonous plants on domestic animals may serve as an object lesson of the dangers of eating plants promiscuously. In certain regions attempts are made to eradicate loco-weed from grazing country, for example. Poison ivy and its effect on humans may lead through intimate experience to a need for information concerning the identification of this plant and a cure for its poison. In some localities certain plants of medicinal value offer opportunities for some financial return to collectors. It has been profitable to be able to recognize ginseng, for example.

Suggestions for Fifth and Sixth Grades.—First aid measures in the treatment of those injured by poisonous plants; a brief idea of how medicinal substances are extracted from medicinal plants; the possible effect of tobacco upon insects and upon humans. These topics may suggest pertinent activities. In addition the medicinal properties of certain common plants might be called to the pupil's attention. Those listed under ornamental herbs might include trillium, bloodroot, Jack-in-the-pulpit, hepatica, dandelion, columbine, and others.

Ground Cover, Forage Plants and Weeds

Nature Magazine References.—Bracken fern, 6-4-231; cat-tail, 10-3-178; cholla, 4-1-45; cocklebur, 1-1-62; eulalia, 12-1-50; ferns, growing, 11-6-391; grass seed test, 12-3-172; lawns, 12-2-108; lawn weeds, 11-4-246; milkweed, 2-1-45; moss, 1-1-43; mullein, 3-2-82; plants of the Sierras, 12-4-251; weed rosettes, 7-1-13; also many of the plants listed under ornamental herbs may be here considered. Farmers' Bulletins and Agricultural College pamphlets and Agricultural journals will with the assistance of encyclopedias give ample additional reference sources.—*General References.*—Pages 339-348; 366-373.

Suggestions for First and Second Grades.—The rôle served by these plants is possibly dual. They supply food for grazing animals and a ground cover which prevents undue erosion and assists in holding moisture. It is doubtful whether this idea in itself should be even presented to first and second grade children. Their attention may be called to the work of water in uncovered hillsides as compared to similarly steep places that are plant covered. They may notice how frequently mossy ground remains damp or even wet when the surrounding ground is dry. These experiences will be worthy as introductory to what may be given later. The grazing problem may be evident in any pasture. Stony, rain-washed pasture and plant-covered lowlands usually provide nourishment for different appearing live stock.

Suggestions for Third and Fourth Grades.—The ideas suggested above may be further elaborated in these grades. The weed problem in its many aspects may be introduced, including weeds as hosts for injurious insects and fungi, weeds as rivals for moisture and sun with cultivated plants, and the indirect value of weeds arising from the conservation of moisture in the soil through cultivation to remove weeds.

Suggestions for Fifth and Sixth Grades.—The rôle of "roughage" in the diet of animals might conveniently appear in human physiology of the simplest sort and be associated with the study of forage plants. The rôle played by these plants as being the major food of many of the domestic animals which furnish us with food, labor, milk and hide is significant and should be appreciated. To it is tied much of the romance of the "wild west" as it used to be at least. Further elaboration of points raised in the other grades is worthy.

Fiber-producing Plants

Nature Magazine References.—Cat-tail, 10-3-178; century plant, 10-4-236; cotton, 3-3-141; flax, 15-5-319; Panama hats and palms, 2-4-231; rayon—forest product, 11-6-392. Certain articles on fiber from trees and from other plants like hemp and flax and even nettles should prove useful. These may be secured from manufacturers of the products of these plants if they are not to be found in current magazines. Reference might also be made to certain outdoor manuals which call attention to wild plants which may serve as a possible commercial source of fiber. *General References.*—Pages 339-348; 366-377.

Suggestions for First and Second Grades.—An appreciation of the need of fiber enters a child's experience frequently. A string to draw a toy, to bind a bunch of flowers, or just to play with is always welcome. Possible sources of material for strings lie all about. The bark of many weeds like milkweeds may be used. Some of these may be collected and used with most primitive efforts. If competition is desired one might ask to see who could secure from nature the strongest string. Possibly a premium should be placed on doing this with the least amount of effort, as well as emphasizing strength. Of course, the strings should be of equal size.

Suggestions for Third and Fourth Grades.— It is not difficult to develop some technique in the getting of fiber material from natural plants. Some schools have made miniature cotton gins, for example, which have proven surprisingly successful. From the cotton thus secured they have with the simplest of apparatus spun reasonably satisfactory thread. In addition to this side of the story, which is largely in the field of industry, attention should remain directed to the problems of growing the plants which produce the raw materials. Scarcely a place exists where some raw material may not be found.

Suggestions for Fifth and Sixth Grades.—An appreciation of why certain regions are able to produce fiber material successfully may be in the realm of geography or of nature education. Suffice it to say a child should know more than just that the south produces cotton. Wild hemp and wild flax may be growing along the railroad right of ways near where children learn about cotton from a book. If the lesson is taught in the south use cotton, possibly. If it is taught elsewhere use the appropriate material.

House Plants

Nature Magazine References.—General, 4-6-359; bulbs, 10-4-222; 14-5-297; daffodils, 8-2-92; Easter lily, 1-3-23; gardens under glass, 10-5-289; lichen gardens, 10-3-197; poinsettia, 12-6-362. Seed catalogues will supply some additional help in this field, and many garden manuals contain information about plants grown out-of-doors which will be useful to those growing them indoors. Agricultural journals frequently run articles on this general subject. *General References.*—Pages 339-348; 366-377.

Suggestions for First and Second Grades.—The recognition of a few of the commoner house plants such as begonia, geraniums, wandering Jews and possibly a few of the bulb plants may be ample exercise for these children. General appreciation of the best conditions under which they grow and how they should be treated should be given. For instance, the effect of handling unfolding fern fronds will prove useful in developing an appreciation that such plants cannot be so handled and prosper.

Suggestions for Third and Fourth Grades.—Problems concerned with potting and repotting house plants and with the various means of propagating them may be undertaken. Possibly the principles of plant propagation may be better demonstrated in classroom groups with house plants than with any other kind of plants. Slips of begonia, geranium and wandering Jew may be rooted and established in window boxes. Some of these plants may be made to take root at points where the stem is buried in soil, and other plants may be grown directly from seeds. The function of the spore masses on fern fronds may be explained, since too frequently these are thought to be diseased in some way. Some suggestion should be made as to the protection of house plants from their enemies such as mealy bugs.

Suggestions for Fifth and Sixth Grades.—Some idea of the commercial value of house plants might be given and, if possible, the children given the experience of visiting some commercial greenhouse. Suggestions as to the artistic grouping both of cut plants and of growing plants in home decoration may be introduced. Children of these grades might assume some responsibility in caring for house plants in lower grade rooms or, as is the case in some schools, of supplying other rooms with plants which they have grown from slips and by other means.

Ornamental Herbs and Wild Flowers

Nature Magazine References.—General, 3-4-209; 9-4-230; Alpine flowers, 13-4-235; Arizona wild flowers, 15-1-22; California wild flowers, 12-4-221; 15-1-22; conservation, 10-1-35; 10-2-119; 10-3-171; 11-4-218; 13-5-308; 13-6-375; cultivated ornamentals, arrangement of cut flowers, 4-4-233; Death Valley wild flowers, 12-4-228; early species, 1-2-29; 1-3-43; Florida wild flowers, 7-3-141; flowers with a history, 10-5-321; Glacier Park wild flowers, 12-1-10; house plants, 4-6-359; National Flower candidates, 12-5-306; 12-6-395; 15-3-149; 15-5-318; New England wild flowers, 13-5-308; plants of Lewis and Clark trip, 12-5-309; protection, 3-6-357; 4-1-11; 9-2-97; 9-5-303; state flowers, 14-2-96; 14-5-314; wild flower gardens, 10-2-119; 11-4-225; 11-5-322; 13-6-375; 14-3-161; wild flower photography, 11-4-239; wild flower puzzles, 5-5-318; Yosemite wild flowers, 10-1-35. Adder's tongue, 9-2-99; anemones, 15-5-305; arbutus, 13-5-308; arrowhead, 12-1-32; aster, 2-3-167; aster, desert, 15-1-22; bitter-root, 10-1-35; blazing star, 10-1-35; bloodroot, 5-5-282; 11-4-218; 13-5-308; bluets, 13-5-308; 14-6-341; bunch-berry, 13-5-308; butterwort, 12-1-10; cacti, 15-2-99; California poppy, 10-1-35; 10-5-321; camas, 12-1-32; camellia, 14-6-341; canterbury bells, 9-3-168; cardinal flower, 4-4-224; 10-1-35; 10-3-171; centaurea, 9-3-168; century plant, 10-4-236; chalice flower, 12-1-10; Christmas berry, 10-1-35; chrysanthemums, 14-2-87; columbine, 2-2-96; 9-3-169; 10-1-35; 11-4-218; 13-2-107; 15-2-93; compass plant, 10-5-321; coreopsis, 9-3-169; daffodils, 8-2-92; dahlias, 13-3-167; daisy, 3-6-366; dandelion, 8-1-23; desert satin star, 15-1-22; devil's tongue, 10-3-191; dianthus pink, 9-3-169; dutchmen's breeches, 5-3-150; Easter lily, 1-3-23; edelweiss, 10-1-25; evening primrose, 15-1-22; foxgloves, 14-4-219; gentians, 2-6-357; 10-3-171; 12-1-10; 13-1-57; 15-5-305; geranium, 9-2-98; gladiolus, 13-1-27; goldenrod, 2-4-212; harebell, 12-1-10; hepatica, 5-2-74; 13-5-308; iceland poppy, 9-3-168; Indian pipe, 5-6-364; 10-3-171; iris, 10-1-35; 10-3-155; 15-6-377; Jack-in-the-pulpit, 3-5-281; Jacob's ladder, 10-1-35; Jimson weed, 10-5-321; Lapland diapensia, 13-5-308; larkspur, 10-3-171; lilies, 10-1-35, 12-1-10, 10-3-171; lilies, gold-banded, 15-4-248; lotus, 8-3-149; 10-5-321; lupines, 10-1-38; 14-6-341; mallow, 33-5-308; mentzelias, 14-2-117; milk vetch, 10-1-35; narcissus, 12-2-117; orchids, 4-2-97; 4-3-168; 7-3-159; 9-1-42; 10-3-171; 13-5-308; 14-6-341; 15-5-305, 319; painted cup, 10-1-35; pansies, 12-1-39; parnassia, 12-1-10; partridge berry, 13-5-308; pasque flower, 10-1-35; passion flower, 10-5-321; 14-6-341; peony, 11-4-260; 11-5-315; pitcher plant, 4-1-50; 5-1-21; 8-2-110; 14-6-341; poppies, 14-1-49; prickly pear, 10-1-35; 14-6-341; primula, 9-3-168; Puritan posies, 13-5-319; rhodora, 10-3-171; roses, 11-3-157; ruellia, 14-6-341; sage lily, 14-2-119; seven-year apple, 14-6-341; shinleaf, 13-5-308; shooting star, 10-1-35; skunk cabbage, 15-5-324; St. John's wort, 12-1-10; snowflower, 10-5-288; 10-1-35; spring beauty, 9-2-98; sunflower, desert, 15-1-22; sweet peas, 13-2-101; trillium, 3-4-239; 7-5-282; 10-1-35; 11-4-218; 13-5-308; 15-4-222; 15-5-305; Texas bluebonnets, 13-2-91; thalictrum, 9-3-169; waterlily, 5-5-294; 10-3-171; 10-5-321; water hyacinth, 14-6-341; wild rose, 10-1-62; 10-3-170; 13-3-181; windflower, 9-2-99; wintergreen, spotted, 10-3-171; yucca, 14-6-341; zinnia, 13-4-251. *General References.*—Pages 366-373.

Anything that will get thoughtless persons to think about the preservation of wild flowers will be worth while, and children can help in the problem, particularly if they know that certain flowers that are attractive may be picked without danger of extermination.

Parasitic Plants and Microbiology

Nature Magazine References.—General, 1-1-26; blewit mushrooms, 11-6-379; cancer root, 15-6-378; coprinus, 1-2-56; destructive of insects, 3-3-151; dodder, 8-2-84; fawn mushroom, 14-3-184; fungi, 11-1-32; 13-1-40; 14-3-173; 15-3-159; 15-4-230; 15-6-375; fungi, small, 8-2-85; fungous diseases, 15-4-235; Indian pipe, 15-5-305; lichens, 4-1-56; lichen gardens, 10-3-197; microgardens, 7-3-148; 8-4-215; micro-organisms, 2-5-292; 9-2-79; morel mushrooms, 11-5-329; mushrooms, 4-3-143 (contains a few errors); oyster mushrooms, 14-2-79; puffballs, 6-2-101; squawroot, 8-2-82; trumpet mushrooms, 13-6-374; wheat rust, 4-1-42. *General References.*—Pages 339-348; 366-373.

Suggestions for First and Second Grades.—The problem of parasitism may easily be introduced in connection with sanitary lessons in these grades. It may make a reason for cleanliness other than that imposed by authority, though it need not necessarily be accompanied by fear. The story of how plants do live upon other living organisms need not be reserved for study in higher educational institutions, particularly when we, to live, must constantly contend with them no matter where we live. If we leave bread uncovered it moulds. If we leave our shoes in the damp they mould. If we keep fruit too long it rots. A simple understanding of these things enters properly into the school education of the child. If it doesn't, false ideas such as the silver spoon test for telling poisonous from edible mushrooms will enter. The impression should not be given, however, that all micro-organisms are injurious, because without them we could not live.

Suggestions for Third and Fourth Grades.—Much of the above material will enter into third and fourth grade work, obviously. The story of the use of these plants in breaking down dead plants so that new plants may grow should not be neglected. A rotten log with shelf fungi on it may serve as a worthwhile subject of study, in order that we may get the story of how these plants live. Dodder and its story is useful, because one can see with the naked eye the unusual method of getting food employed by the plant.

Suggestions for Fifth and Sixth Grades.—The means of controlling those plants which need control and encouraging those worthy of culture furnish ample material for study here. One should have this understanding and appreciation since we must have it to live. Past civilizations which did not have it, passed into oblivion, very largely because of this omission in their knowledge.

Aquatic Plants and Marsh and Bog Plants

Nature Magazine References.—Aquarium, 8-5-271; arrowhead, 12-1-32; cat-tails, 2-1-37; 10-3-178; 15-5-305; lotus, 11-5-294; 15-5-305; water lily, 15-5-305. Other references appear in connection with general articles dealing with the sea and with freshwater. *General References.*—Pages 339-348; 366-373.

Suggestions for First and Second Grades.—The rôle played by plants in water is of course essentially that played by plants on land. They serve as purifiers of the air and as food and shelter for the animal life which may live among them. An aquarium stocked with goldfish only is not nearly so successful from any standpoint as an aquarium with fish and plants. Children of the early grades need not necessarily recognize many aquatic plants, but they may recognize that these plants are different from land plants in many ways. Those that are strictly aquatic, for example, cannot as a rule remain erect out of the water, as can land plants, their stems are less stiff so that they may give with the moving water instead of being broken off. Things of this sort are easily seen and significant to further work with these plants.

Suggestions for Third and Fourth Grades.—The stocking of an aquarium with plants can be undertaken as a class activity. Possibly conditions may be such that the class may see that the plants when in sunlight give off bubbles of a gas. This will help in an appreciation of how land plants as well as water plants live. Attention should be called to the frequently large air storage areas in aquatic plants, to the rather unusual root systems, and possibly on occasion to the flowers. The general differences between many marsh plants, such as cat-tails, and plants of drier grounds may also be considered. The insects found living in a cat-tail head, for example, bring up many interesting bits of study.

Suggestions for Fifth and Sixth Grades.—If convenient the story of a bog and of coal formation should be brought up, as a development of the study of aquatic and marsh plants. Reference may also be pertinent in certain communities to the value to be reaped from the plants of the sea, from the standpoint of fertilizer as well as an indirect source of food for animal life. It should be appreciated that the parts of the earth covered with water offer us a practically undeveloped source of food supply.

Ornamental Woody Plants

Nature Magazine References.—General, 3-4-209; 5-2-87; 5-3-182; 9-4-230; nut trees, 11-2-126; shrubs with winter berries, 10-6-357; taming wild shrubs, 12-5-316; tree flowers, 11-4-230; tree surgery, 12-3-188. Arbutus, 1-2-30; 3-4-229; azalea, 5-5-289; bittersweet, 4-5-283; cactus, 3-6-364; cherry, 1-4-21; Christmas greens, 10-5-301, 10-6-382, 386; 14-5-296, 15-1-16; cypress, Monterey, 4-2-101; deodar, 4-1-55; dogwood, 5-4-249; dwarf cornel, 9-2-98; elderberry, 6-1-41; evergreens; 12-3-167; frost grapes, 14-4-225; hibiscus, 8-5-289; highbush cranberry, 5-1-29; holly ranches, 14-5-296; horse chestnut, 1-5-24; huckleberry, 5-4-238; hydrangea, 6-3-164; magnolia, 11-3-184; nannyberry, 5-1-29; palms, 2-2-115; rhododendron, 7-6-349; roses; 5-6-371; 7-4-207; shadbush, 5-4-215; snowball, 15-5-319; yucca, 9-1-21. Tree and shrub books and pamphlets supplied by nurseries should provide welcome additional references if the above and standard nature references are not sufficient. *General References.*—Pages 339-348; 366-369; 373-377.

Suggestions for First and Second Grades.—Sufficient and profitable activity in this field for this group may concern itself with the identification of a few of the commoner ornamentals which are of local interest. This may be associated with color work and with general exercises dealing with decoration. Pussy willows may serve as a motivation for recognizing that particular kinds of shrubs grow in more or less particular kinds of places. Recognition of this fact will later be useful in locating desirable shrubs and in planning for their use in connection with Arbor Day.

Suggestions for Third and Fourth Grades.—It might be profitable to keep a calendar devoted to the flowering of ornamental shrubs to fix the idea that given species flower at given times. This is useful in planning clumps of shrubs to insure attractiveness over a period of time. Many ornamental shrubs offer splendid opportunities for the studying of the interdependence of insects and the development of fruits. Yucca may be pollinated by hand when grown away from its natural environment.

Suggestions for Fifth and Sixth Grades.—Shrubs are frequently more easily transplanted than trees and equally useful in landscaping at times. See the general section on woody plants for help on transplanting trees. Some little practice might be given in selecting species of the right height to meet the landscaping needs on the school ground. Paper landscapes with paper trees help considerably in this problem as preparatory work.

Timber- and Pulp-producing Plants

Nature Magazine References.—General (see forestry under woody plants in general), uses of wood, 9-2-113; Arbor vitæ, 6-6-344; aspen, trembling, 7-4-240; balsa, 4-3-166; basswood, 1-2-10; beech, 1-4-43; birch, red, 1-1-17; cherry, wild, 1-2-54; elm, American, 1-6-19; eucalyptus, 7-4-240; hickory, shagbark, 2-5-296; insect pests in timber, 10-5-309; lumber in the home, 10-6-401; maple, red, 4-3-173, sugar, 1-3-17; 7-4-240; oak, black, 2-4-239; oak, cork, 5-5-297; oak, live, 7-4-240; pine, of Timagami, 5-6-357; pine, long-leaf, 4-2-114; pine, white, 2-4-219; 3-5-297; rayon, forest product, 11-6-392; redwoods, 1-2-49; 5-1-47; 6-3-174; 8-2-107. *General References.*—Pages 339-348; 366-369; 373-377.

Suggestions for First and Second Grades.—Recognition of one or two trees of this type and possibly the drawing of them or cutting of them in paper may be sufficient for first graders. Many Christmas trees are of the pulp- or timber-producing type, and their study may be sufficient to supply the experiences desired here. It might be worth while to ask the children to see how many different things they find are made of wood, in order that they may get some appreciation of its general value.

Suggestions for Third and Fourth Grades.—The story of how trees grow. Suggestions as to reading the age of trees by rings and of twigs by the markings on them are in place. Counting the number of years' growth showing in the top of a typical school desk is useful in fixing the idea that wood does not grow in a few years. The recognition of a few timber and pulp trees as such, together with some knowledge of how they grow, is valuable. This would include knowledge as to whether they were deep rooted or shallow rooted and something of their soil and water requirements.

Suggestions for the Fifth and Sixth Grades.—Problems related to the propagation of timber and pulp trees, such as are outlined in "The Forestry Primer" should be presented here. If possible, children of this age should be given the opportunity of planting some trees, preferably as a part of a community program. The story of paper making should be briefly understood, and possibly the story of other materials such as artificial silk that are made from forest products.

ANIMAL STUDY

Bird Study in General

Nature Magazine References.—African birds, 14-2-83; banding, 1-5-15; 11-3-197; bird bartenders, 11-5-298; bird bath, 15-1-46; 15-6-406; California birds, 12-4-214; 15-1-42; caterpillars and birds, 10-3-184; cats and birds, 13-6-378; coloration, 10-5-320; conservation, 15-1-44; 15-2-116; 15-3-141, 182; courtship, 1-1-46; 8-2-81; desert birds, 7-6-339; 11-2-78, 102; 11-5-286; destruction of birds, 2-4-247; 2-5-306; English birds, 13-4-230; extinct birds, 6-1-20; 11-6-357; 12-2-119; 12-3-182; 12-5-301; feeding, 10-6-355; 11-1-33; 13-5-299; Florida birds, 14-6-357; French birds, 13-2-93; 13-3-171; Hawaiian birds, 15-4-237; houses for birds, 1-6-51; 11-3-189; 13-3-183; 15-2-86, 115; 15-6-406; life history, 7-5-306; method of teaching about, 7-3-175; Michigan birds, 15-5-293; midsummer birds, 10-2-103; migration, 11-3-161; 12-3-171; 15-1-11; 15-4-269; Mississippi flood and birds, 10-1-31; multiple nests, 12-3-193; music, 15-4-224; names, 11-2-85; nesting, 3-4-197; 3-5-261; 7-5-271; protection of birds, 2-6-325; puzzles about birds, 5-4-250; 10-1-30; 10-2-111; 10-5-323; 10-6-364; 12-1-59; seasonal, 1-3-9; Sierra birds, 12-4-251; snake birds, 15-2-113; songs of birds, 7-6-365; 8-5-276; 9-1-48; southwestern birds, 11-2-78, 102; 11-5-286; speed of birds, 1-6-62; state birds, 11-3-194; 15-2-130; 15-3-198; Swiss birds, 13-6-379; teaching about birds, 3-4-236; 4-3-178; 7-3-175; Transatlantic flights, 11-3-161; trees for birds, 1-5-31; tropical birds, 15-1-11; 15-4-249; useful birds, 1-2-7; winter birds, 5-2-75; 7-1-7; 8-6-329; 11-1-33; 11-3-182; Yosemite birds, 7-3-162; young birds, 1-6-15; 11-4-243; 11-6-371; 15-4-223; 15-6-371. *General References.*—Pages 339-353; 353-358.

Bird study might consistently be built primarily around the service which birds perform for men. This service is obviously varied, and there are many types of birds to meet the demands of the types of work to be performed. If nature work in the grades is based on this viewpoint, it will be unnecessary that the teacher be able to name every species of bird found in order to give a satisfactory lesson. The most important thing to get is not the name but to recognize the service performed. To be sure, the name is useful from a cultural standpoint and for the purpose of serving as a key to the observations of others, but it is not necessary to a good nature study lesson. Problems in bird study, which lend themselves well to schoolroom use, concern themselves largely with the topics suggested in the references at the top of this page. These cover the economy of birds as well as the ways in which they live, including their means of communicating with each other, their means of securing food, and their means of protecting themselves from their enemies. It might be well to give more emphasis to migration stories than is easily available through the above references. Any general bird handbook should provide this information. This will be particularly useful in connection with the geography of our hemisphere, since the birds of our country reach the countries of the south during their winter pilgrimage. Information concerning bird banding may be secured from many sources, particularly the Biological Survey at Washington, D. C. This work has been basic in studying migration habits.

It might be refreshing to have bird study vary from the traditional bird calendar and consist of or include a study of the habits of some one pair of birds which may be observed actually carrying on their home activities. Too frequently the desire to report new species on a calendar produces impossible reports and tends to dissipate effort which might more profitably be confined to common species. It has been the experience of many who judge calendars to find that too frequently the commoner species like English sparrows and robins are not reported, while many obviously inaccurate observations are recorded. It is evident that this is unfortunate.

It might be well to keep a note book or a few pages in a note book for each of the major units suggested under bird study. This should generally be preliminary to book study, the book study being reserved for the purpose of enriching the experiences recorded in the note book.

It is hoped that each year a child may have an experience with a bird or birds in each of the major groups suggested, though if this is inconvenient the field may be covered in a two year cycle. One should avoid studying only those birds which seem to be attractive because of song, plumage or habits, since this does not give a true picture of the role played by birds in nature. Limiting bird study to the study of one species alone as a type does not give a true picture either, and so is not here suggested.

Copies of the local game laws should be secured in connection with bird study and civics. An analysis of these laws will prove profitable, providing the student has an appreciation of the life habits of the birds considered. The tendency of many species to congregate at migration time has frequently given local observers a false impression of the abundance of individuals of those species.

Bird study as an end in itself is inferior to bird study as a means of interpreting civics, making geography more real, and motivating language and drawing.

Birds of the Open Air

Nature Magazine References.—Chimney swift, 9-6-356; flycatcher, scissor-tailed, 4-4-229; horned lark, 12-2-91; martins, 14-5-308; nighthawk, 10-2-103; 13-1-56; swallow, barn, 7-5-306; swallow, violet-green, 7-4-223. Add birds of your environment such as the nighthawk and almost any of the swallows, such as bank swallows, cliff swallows, rough-winged swallows and the like. *General References.*—Pages 339-353; 353-358.

Suggestions for First and Second Grades.—Notice the ease with which birds of this type fly. Notice that they are active generally at particular times of day. They catch their food on the wing, snapping it up with their mouths that are larger than they appear superficially. Their feet are very poorly developed because they have no great need for them. These birds are, or should be, a part of the picture of the sky. Few birds are more wholly useful. Notice that the swallows and swifts generally appear in flocks.

Suggestions for Third and Fourth Grades.—Learn to recognize some of the calls of these birds. If purple martins nest near you make a particular study of them. In the country, barn swallows may be most easily studied, and in the cities, swifts and nighthawks. Of the group, any one of which will do as well as another for our purposes, the nighthawks nest on the ground and the others in holes in various places. Though the swallows are essentially social birds, do they exhibit a high or low degree of division of labor and responsibility, or is it apparently a case of everyone for himself? The mating antics of swallows are interesting, and, if purple martins are present, the spring will give you a splendid example of the fighting ability of these birds when they return to claim the nest boxes which the sparrows have probably begun to occupy.

Suggestions for Fifth and Sixth Grades.—The migration story of most of the birds of this type is worth study. The nature of their food necessitates their migrating south probably more than with any other group here considered. Learn from direct observation as much of the life history of the birds of the group as possible, and then be sure to appreciate the fact that all are most useful. If possible, do something to erect or protect nesting sites.

Birds of Trees and Shrubs

Nature Magazine References. — General, 1-2-7; 9-6-373; Albino birds, 12-2-118; bird names, 11-2-85; bluebird, eastern, 6-1-45; bluebird, mountain, 5-5-287; bluebird, western, 8-3-160; blue jay, 10-4-233; 11-1-33; 11-2-85; brown creeper, 11-1-33; bushtit, 11-5-286; catbird, 4-3-155; 6-1-40; 10-2-103; chickadee, chestnut-backed, 8-3-160; oregon, 8-3-160; Clark's crow, 15-3-165; crossbill, 11-1-33; crow, 15-2-88; cuckoo, 1-2-9; 9-3-155; cuckoo, yellow-billed, 10-2-103; dove, mourning, 10-1-42; 10-2-103; 15-1-51; flicker, 2-1-30; 7-5-306; 12-2-78; flycatcher, scissor-tailed, 11-5-286; flycatcher, vermilion, 11-2-78; grosbeak, cardinal, 10-2-103; grosbeak, rose-breasted, 10-2-103; hummingbirds, 6-2-71; 13-6-397; 15-1-50, 62; 15-5-293; jay, California, 11-5-286; jay, pinyon, 10-2-102; kingbird, 10-2-103; 10-4-221; kinglet, western golden-crowned, 8-3-160; kinglet, ruby-crowned, 8-3-160; massena trogon, 15-4-249; mockingbird, 10-2-103; 12-2-118; nuthatch, white-breasted, 1-2-47; 11-1-33; oriole, Bullock, 11-2-78; palm chatterer, 15-2-88; paroquet, 12-3-182; phainopepla, 11-2-78; phoebe, 10-4-255; 12-3-193; redstart, 10-5-285; robin, 11-2-101; 11-4-228; 15-1-60; shrike, loggerhead, 10-2-83; sparrow, English, 11-1-33; sparrow, song, 11-1-33; sparrow, tree, 11-1-33; starling, 11-1-33; tanager, Louisiana, 11-5-286; thrasher, brown, 10-2-103; thrasher, sage, 11-2-78; thrush, hermit, 15-5-293; wood, 10-2-103; 11-3-166; titmouse, tufted, 11-1-33; trogon, massena, 15-4-249; verdin, 11-5-286; waxwing, cedar, 11-1-33; 15-5-293; wren, Alaska, 10-5-286; wren, canyon, 11-5-286; wren, house, 10-4-268; 10-5-336; wren, Texas, 10-4-258; wood pewee, 15-5-293; woodpecker, 11-5-298; woodpecker, California, 11-2-78; woodpecker, downy, 11-1-33; woodpecker, hairy, 12-2-78; woodpecker, ivory-billed, 13-2-113; woodpecker, Lewis', 12-2-78; woodpecker, pileated, 12-2-78; woodpecker, red-bellied, 12-2-78; woodpecker, red-headed, 12-2-78; warbler, Kirkland, 15-5-293. *General References.*—Pages 339-353; 353-358.

Suggestions for First and Second Grades.—Recognize the various types of work which have to be done in keeping trees and shrubs clear of insects, and, if possible, recognize at least one kind of bird which does each of these kinds of work. The humming bird cleans most delicate material, for example, while the woodpeckers do the more rigorous work.

Suggestions for Third and Fourth Grades.—Keep a record of the time of year when these birds are present. Where and when do they nest? The young of all species are helpless when hatched and so need particular care by the parents. Record feeding schedules.

Suggestions for Fifth and Sixth Grades.—Understand the necessity of keeping these birds constantly under the protection of the law. Determine from books the migration habits of the species being studied. Get some information on what has been learned through bird banding. How do the bills of these birds differ, depending upon where their food is to be found? Read *Nature Magazine,* 5-4-250.

Birds of Prey

Nature Magazine References.—General, 1-2-7; 2-2-77; 3-1-20; pleas for, 10-1-front cover; 12-3-194; 12-3-196; 15-3-141; condor, California, 8-2-95; 9-6-378; crow, 4-1-13; 7-5-306; eagle, American, 2-5-261; 4-3-133; 7-1-45; 9-3-143; eagle, bald, 12-1-35; 15-3-141; falcon, peregrine, 13-1-42; 15-6-383; hawks, 10-1-front cover; 12-3-171; hawk, broad-winged, 9-1-32; hawk, Cooper's, 9-1-32; hawk, duck, 9-1-32; hawk, goshawk, 9-1-32; fish hawk, 9-1-32; hawk, marsh, 9-1-32; hawk, red-shouldered, 9-1-32; hawk, rough-legged, 9-1-32; sparrow-hawk, 9-1-32; hawk, sharp-shinned, 9-1-32; hawk, Swainson's, 9-1-32; jay, California, 15-1-42; jay, Rio Grande, 8-5-275; owl, 3-1-20; 4-3-178; owl, barn, 11-3-153; 12-3-196; owl, burrowing, 8-6-363; owl, elf, 1-3-31; 2-5-303; 7-1-17; 15-3-143; owl, great horned, 8-2-102; 9-2-83; 15-3-143; owl, long-eared, 15-3-143; owl, screech, 4-1-23; 15-3-143; owl, snowy, 15-5-293; owl, spotted, 11-1-57; 15-3-143; turkey vulture, 2-1-33; 9-6-367. *General References.*—Pages 339-358.

Suggestions for First and Second Grades.—Notice the unusual eyes, beaks and feet of these birds. If possible, learn to recognize the flight of hawks from that of crows and some other birds. Get the idea that there are birds of prey active by night and by day. If possible, learn general differences in calls of a crow, a hawk and an owl, that is, what do they seem to say? Young are all helpless when hatched and require care of parents. What in general do these birds eat?

Suggestions for Third and Fourth Grades.—Except for the crows these birds are essentially non-gregarious during the year. How do they protect themselves? Learn, if possible, to recognize a few species in flight, or where to look for the different species. Learn to interpret as great a number as possible of the calls of crows. Notice the main differences in the nature of the feathers of hawks and of owls, with possible explanations for the differences. Note the times of year different species are present. Where do the various species nest? Do they nest earlier or later than most other species of birds? What is the food of the young?

Suggestions for Fifth and Sixth Grades.—Where and when do the species migrate? What species are essentially useful and what ones undesirable? What is the general role of birds of prey in the economy of nature? Are they entitled to greater or to less protection than they receive? What dangers can you see in suggesting vermin campaigns to be conducted by anyone with a hunting license? Note proportion between size of body and of wings and correlate ability to soar with lesson on warm air rising.

Domestic Birds

Nature Magazine References.—Cage birds, 4-6-347; 11-4-237; chickens, 8-1-17; ducks, mallards, 9-1-29; parrots, 7-2-91; 12-6-396; pheasants, 5-6-365; pigeons, 1-2-21; 13-1-22; pigeon whistles, 4-1-47; turkey, 4-5-289; 6-6-332. *General References.*—Pages 339-353; 353-358.

Suggestions for Grades One and Two.—In which of these species are the little ones able to run about by themselves soon after they are hatched? How do ducks and chickens and canaries differ in their feet, in their bills, in the position of their legs, and in their feathers? Parrots are more nearly like which one of these three, and why? Compare these birds with other domestic birds like turkeys, geese, peafowl, guineas and others. Learn some of the calls of the birds available for study.

Suggestions for Third and Fourth Grades.—Which of those available for study have young that are not easily raised? What is the food of these young and why does this make it difficult to raise them? Learn to interpret as many as possible of the calls of barnyard fowl. Can you, for example, recognize in their calls the following: fear, invitation, exultation, content, inquiry, caution? How do these domestic birds differ in their incubation period? What is the relation between the length of the incubation period, the relative size of the eggs, and the development of the young when hatched? Learn if possible to distinguish the sexes in as many of these birds as possible. Both sexes are necessary, of course, for the production of fertile egg, though eggs will be laid without the presence of the male. Learn if possible from observation or from some agricultural bulletin the signs which indicate desirable members of a flock of chickens, and also the signs indicating unproductive members.

Suggestions for Fifth and Sixth Grades.—Learn how to properly house, feed and care for the birds here considered. This should be considered not only from the economic but from the humane angle. Recognize that most domestic birds respond to care in many ways. If possible, have some children of the class report on pet birds which they are keeping outside of class, or better have a pet which is being cared for in the school by the children.

Birds of Waterways

Nature Magazine References.—General, 1-4-46; 2-1-36; 2-2-77; 2-4-201; 2-5-278; 5-3-173; 7-3-173; 9-1-41; 9-6-349; freezing, 11-3-182; duck skeleton, 12-1-59; Albatross, 15-4-237; auk, great, 11-6-357; avocet, 9-4-237; blackbird, red-winged, 10-2-103; 10-4-227; bittern, tiger, 12-5-315; bittern, American, 15-1-27; booby, 15-4-237; crane, sandhill, 11-4-221; crane, whooping, 14-3-168; curlew, 14-3-139; dowitcher, 8-1-31; ducks, 8-2-81; crippled, 14-5-319; skeleton, 12-1-59; baldpate, 10-5-305; duck, black, 10-5-305; duck, canvas-back, 10-5-305; duck, gadwall, 10-5-305; Labrador, 12-2-119; duck, lesser scaup, 10-5-305; duck, mallard, 2-1-35; 7-5-306; 10-5-305; duck, muscovy, 11-3-193; duck, pintail, 10-5-305; duck, redhead, 10-5-305; duck, shoveller, 10-5-305; duck, surf scoter, 5-6-343; duck, wood, 4-2-84; 8-6-335; egret, 1-2-3; flamingo, 5-1-11; 12-6-379; frigate bird, 15-4-237; gannet, 10-1-43; 15-4-237; goose, wild, 6-5-265; 8-3-171; 9-1-9; 9-2-107; grebe (helldiver), 3-3-138; grebe, western, 5-4-226; gull, 1-3-33; 6-4-221; gull, herring, 15-5-293; heron, 4-5-279; heron, great blue, 6-3-149; heron, night, 11-5-307; love bird, 15-4-237; limpkin, 14-4-211; man-o-war bird, 6-5-283; murre, 6-3-159; 15-2-87; osprey, American, 14-1-23; ouzel, water, 6-1-19; 11-2-78; 12-3-161; pelican, 4-2-91; 6-2-95; 12-6-400; penguin, 5-2-89; phalarope, 14-2-97; plover, American black-bellied, 9-4-237; plover, children's, 6-1-26; plover, golden, 9-4-236; plover, killdeer, 7-5-306; 11-6-387; plover, semi-palmated, 9-4-237; rail, king, 10-3-175; sandpiper, spotted, 15-5-293; skimmer, 11-1-30; snipe, Wilson's, 9-4-236; stilt, black-necked, 5-5-299; 9-4-237; stork, 13-1-35; surfbird, 10-3-165; 12-6-367; swan, black, 8-4-236; teal, cinnamon, 10-5-305; teal, green-winged, 10-5-305; teal, blue-winged, 10-5-305; swan, trumpeter, 14-1-11, 14; tern, 7-6-351; tern, arctic, 11-3-161; tern, white, 15-4-237; tern, Caspian, 15-5-289, 293; tern, common, 15-5-293; turnstone, ruddy, 9-4-237; willet, 9-4-236; yellow-legs, 9-4-236; yellow-legs, greater, 15-5-293. *General References.*—Pages 339-353; 353-358.

Suggestions for First and Second Grades.—Recognize if possible one of each of the deep-water, shallow-water and shore types. Note possible differences in legs and necks depending upon place occupied.

Suggestions for Third and Fourth Grades.—Emphasize means of self protection due to color, action and inaccessibility of home. Interpret if possible calls and what they mean. Get some idea of the habits through the seasons in which species are sometimes more solitary and sometimes gregarious. Do members of flocks work as individuals or are responsibilities divided? Recognize dangers and value of flocking habits. Compare bills and variety of food.

Suggestions for Fifth and Sixth Grades.—Learn, if possible migration story of forms selected and follow on map showing regions occupied in various seasons. Learn something of the open seasons, and the bag limit of the game species.

Birds of the Drier Ground

Nature Magazine References.—General, 1-1-13; 3-1-36; bobwhite, 3-6-370; 4-4-209; 12-5-295; 15-5-332; bunting, snow, 11-1-33; desert birds, 11-2-78, 102; 11-5-286; dove, mourning, 7-5-293; 10-1-42; 10-2-103; flicker, 12-2-78; grosbeak, cardinal, 10-2-103; grosbeak, western evening, 8-3-160; grouse, ruffed, 11-5-314; 15-1-52; 15-5-293; grouse, sage, 3-2-69; heath hen, 6-2-109; 10-2-88; horned lark, 12-2-91; junco, Oregon, 8-3-160; meadowlark, 8-3-160; 15-1-26; ostrich, 1-6-43; owl, burrowing, 14-5-276; owl, ground, 12-5-296; plover, mountain, 14-3-151; prairie chicken, 15-5-293; purple finch, California, 8-3-160; quail, California, 8-3-137; 8-4-223; 8-5-285; 15-1-42; rain-quail, 15-3-150; road-runner, 7-1-79; robin, 11-2-101; 11-4-228; sparrow, English, 7-5-306; 9-4-228; 11-1-33; sparrow, song, 6-4-209; 11-1-33; sparrow, tree, 11-1-33; sparrow, white crowned, 8-4-217; starling, 11-1-33; thrasher, brown, 4-2-113; towhee, Oregon, 8-3-162; woodcock, 8-3-176; 9-4-235; 12-2-113; 15-3-182; 15-5-293, 332; whippoorwill, 10-2-103; 14-2-98; wren, Alaska, 10-5-286; wren, canyon, 11-5-286; wren, house, 10-4-268; 10-5-336; wren, Seattle, 8-3-162; wren, Texas, 10-4-258; wren, western winter, 8-3-162. *General References.*—Pages 339-353; 353-358.

Suggestions for First and Second Grades.—Point out how a bird of this type secures food. Is it just picked up, scratched for or bored for? If one of these devices is used what peculiarity of the bird makes it possible? Learn where to look for the various ones of these that live near your playground. Some of these birds eat insects, some eat seeds and plant material. Decide, if possible, which is which. Though these birds feed for the most part on the ground, many of them may nest above the ground. Do these birds fly as well as swallows?

Suggestions for the Third and Fourth Grades.—Learn if possible some of the songs of these birds. Some of the best songsters are in this group. Are these birds as likely to be in flocks as were the swallows? Are they more likely to be in flocks at one time of year than another? Look for peculiar feathers which show while the birds are in flight but are hidden when the birds are at rest. These are thought to be useful in keeping flocks together during migration and possibly in deceiving pursuing enemies. These show particularly well on meadowlarks, juncos and mourning doves.

Suggestions for Fifth and Sixth Grades.—Most of these birds are essentially useful. In some parts of the country some of them are shot for food. The insect eaters of the group migrate. Generally they do not migrate as great distances as some of the other species, though this is by no means always so. Learn the migration story of at least one species. Watch one of these birds for an hour during feeding time to determine the role played in nature by it.

INSECTS AND THEIR KIN (Invertebrates)

General Treatment

Nature Magazine References.—Bedbugs, 10-6-359; beetles, ladybird, 10-4-249; breeding insects, 15-1-40; 15-2-84; 15-3-171; 15-6-376; butterflies and moths, 10-3-184; 15-5-322; caterpillars, 2-4-242; 10-2-99; 10-3-195; 10-6-361; 15-5-322; 15-6-376; control, destruction of insects by fungi, 3-3-151; cockroaches, 11-5-304; common butterflies, 5-5-291; daddy longlegs, 8-4-222; Dominican music makers, 8-3-155; fireflies, 10-1-15; forest trees and insects, 5-5-311; flight of insects, 2-2-75; Florida marine life, 15-1-33; garden pests, 10-1-17; 10-4-249; 11-2-103; 13-6-393; habits, armed insects, 6-1-37; harmful insects, 4-3-163; 10-1-17; 10-2-99; 10-4-249; 10-5-309; 10-6-359; 11-2-103; 11-5-304; 12-1-49; 12-2-117; 13-2-84; 13-6-393; 14-1-41; helpful insects, 10-2-99; 10-4-249; 12-5-292; 13-2-84; hornets, 15-3-193; house pests, 10-5-309; 11-5-304; how insects pass the winter, 3-4-223; insects stealing from flowers, 4-1-12; lac insect, 12-5-292; mimicry, 15-4-221; mosquitoes, 14-1-41; moths, 3-3-159; 7-4-218; musical insects of Japan, 5-4-220; New England insects, 13-5-333; parasites, 15-1-7; 15-2-84; pearls, 7-4-213; pests of books, 7-1-23; photographing insects, 11-3-168; 14-1-28; punkies, 12-1-49; sense of taste in insects, 3-4-208; snails, 14-4-207; 15-2-105; spiders, 2-5-281; 4-1-48; 7-3-145; 7-4-230; spider vs. snake, 15-4-234; strength, 15-4-229; summer insect songs, 8-2-77; trapping insects, 11-2-103; trails, 14-4-222; wasps (spider hunting), 12-3-166. *General References.*—Pages 339-353; 358-363.

An attempt has been made to present in fairly easily defined and recognized units some of the relationships for which invertebrate animals are responsible. Some of the references given above are so general in nature that it was thought inadvisable to repeat them wherever they were pertinent, and many of them may be used in answering problems raised in the section outlines. It was the purpose to suggest slightly different viewpoints with the different groups, so that a study of all would give a general idea of the work of these creatures. Many of these topics are so closely tied up to plants and to animals that the only excuse for separating them here is on the basis of convenience for reference purposes. Most invertebrates show much apparent cleverness in protecting themselves from their enemies and in securing their livelihood and are more easily experimented with than are some of the larger animals. When one realizes also that we are much more liable to be driven out of existence by the activities of these smaller animals than by the larger animals, the fact is impressed upon us that knowledge concerning these creatures is not only academic but practical. One cannot help but feel that in many courses of nature study undue emphasis is placed on such subjects as birds, to the loss of emphasis on general invertebrates.

Small Animal Life in Fresh Waters

Nature Magazine References.—Aquarium, 8-5-271; 10-1-61; brook life, 11-5-289; clams, 1-2-60; crane-fly, 8-1-32; crayfish, 8-1-12; 8-2-112; dragon flies and damsel flies, 4-2-107; 8-1-32; fish-killing insects, 2-2-119; giant waterbug, 15-3-152; mayfly, 5-6-351; mosquito, 2-1-49; 14-1-41. "Fresh-water Biology," "The Life of Inland Waters," "The Brook Book" and many other references should prove most useful in handling situations which arise from children working and playing in fresh waterways. *General References.*—Pages 339-353; 358-363.

Suggestions for First and Second Grades.—It is sometimes more difficult to get a child away from a pond or brook than it is to get an adult to it. Turned over stones yield all sorts of treasures which may be transferred to aquaria for study afterwards. If it is considered dangerous for children of this age to undertake such work let them at least have an aquarium in school which is populated with the life from nearby streams and not by exotic gold fish alone. A child may learn to recognize the major kinds of life to be found such as snails, hairworms, leeches and possibly some of the more conspicuous insects. The work which each of these creatures may do in an aquarium may be determined with considerable ease.

Suggestions for Third and Fourth Grades.—The life histories and identification of members of the major groups available for study may be undertaken either out of doors or in an aquarium. It might be worth while to rear mosquitoes through their life history in a covered tumbler so that the relationship between mosquito wrigglers, mosquitoes and stagnant water may be appreciated. If possible, recognize at least one aquatic creature that feeds upon plants, one aquatic plant, one creature that feeds upon other animal life and one scavenger.

Suggestions for Fifth and Sixth Grades.—Continue suggestions made for previous grades. If necessary conduct a campaign against mosquito breeding grounds, at least suggesting that cans containing water be tipped over rather than left as convenient mosquito breeding grounds. Some appreciation of the relation of mosquitoes to health may be offered, and certainly there should be presented the importance of small forms of animal life as food for fishes which may feed us.

Small Marine Life (Invertebrates)

Nature Magazine References. — General: Marine animals, flower-like, 5-5-277; marine life, miscellaneous, 4-1-17; marine shells, 6-2-83; Puget Sound, 13-2-97; seashore life, 1-3-16; 1-6-29; 12-2-103, 13-2-97; 13-3-165; 14-2-103; barnacles and their allies, 8-5-299; clams (goeducks), 3-3-178; 13-3-165; corals, 15-1-33; crabs, 4-1-54; 14-2-103, 15-1-33; devil-fish, 4-5-303; compass medusa, 8-4-228; lobsters, 11-2-130; 11-6-377; oysters, 11-2-99; Portuguese-man-of-war, 1-1-58; sea fans, 15-1-33; seashells, 12-5-297; sea urchins, 15-1-33; sponges, 1-5-45; 13-1-43; 15-1-33; star-fish, 15-1-33. *General References.*—Pages 339-353; 358-363.

Suggestions for First and Second Grades.—The merest vocabulary concerning invertebrate marine life should be sufficient for these grades. Crabs, barnacles, sea anemones, sea urchins and the like offer ample opportunity for interesting work. If these are not available the beach may produce an abundance of shells of various types with which to work. Simple identification sheets such as "Atlantic Coast Shells" and "Pacific Coast Shells," published by Comstock Publishing Company of Ithaca, N. Y., will be useful to teachers who wish to help children in this field. In Los Angeles and some other coast cities short time salt-water aquaria serve to let those who cannot visit the shore see some of the living forms of life.

Suggestions for the Third and Fourth Grades.—The means by which marine animals protect themselves and secure their food are so varied and spectacular that they can be made a special study, even though one does not identify all things found. The ways in which some of the sea-weeds manage to hold fast to wave beaten rocks or remain erect in deep water are worthy of study.

Suggestions for Fifth and Sixth Grades.—A general appreciation of the interdependence of the various forms of sea life may be emphasized. Some unique associations are formed for mutual benefit in matters of protection and food supply. At least a slight appreciation of the possible food resources offered by sea life either directly or through influence as fertilizer for land plants may be given. A hint of the laws governing fishing for oysters and fish is worth while if it is accompanied with the reasons for these laws.

Domestic Insects

Nature Magazine References.—Bees, 12-2-95; 14-1-28; honey bee, 4-3-162; 6-3-140; 8-1-39; silkworm, 8-6-355. The United States Department of Agriculture and many agricultural journals will supply ample help for further study of bees. Many silk manufacturing concerns supply useful printed material explaining the steps in silk manufacture. Most encyclopedias give rather extended articles on these subjects. *General References.*—Pages 339-353; 358-363.

Suggestions for First and Second Grades.—An appreciation of bees and silkworms as the source of honey and silk need not enter into the detailed steps by which these materials are secured. The work of honey bees can be observed practically everywhere where civilization maintains itself so there is greater probability that bees will be understood as domestic insects than that all children should know about silkworms. Children can notice that bees in their work in flowers frequently cover themselves with the golden pollen and it may be explained that this helps other flowers to which it is carried.

Suggestions for Third and Fourth Grades.—It would be ideal if an observation beehive could be maintained or if silkworms could actually be reared and made to produce their silk. Not a small number of schools have followed the production of silk clear through from the silkworm to the silk which the children themselves spun on home-made looms. Strangely enough some of these same schools have done nothing with bees that work as industriously for man as do the silkworms. An understanding of the division of labor in a beehive should be presented if possible.

Suggestions for Fifth and Sixth Grades.—Some understanding of the economic significance of the work of domestic insects should be given. In the case of bees this is two-fold because of their influence on plants. Incidentally, appreciation of the value of bees will put a new value upon otherwise worthless plants from which bees collect nectar. Possibly some idea of the species of plants producing the best grade of honey and those producing inferior honey can be presented.

Insects and Their Kin in Trees and Shrubs

Nature Magazine References.—Bagworm, 15-3-166; bee, leaf-cutter, 7-6-350; beetle, Japanese, 4-5-297; beetle, ladybird, 10-4-249; borer, peach tree, 10-2-93; butterfly, yellow swallow-tail, 6-1-31; 8-1-32; caterpillar, 10-2-99; caterpillar, sphinx, 12-3-164; caterpillar, tent, 7-4-211; cicada, 8-1-32; 9-5-288; 15-6-394; fruit-fly, Mediterranean, 14-6-354; hornet, 8-1-32; katydid, 6-5-305; 8-1-32; moth, cecropia, 8-1-32; moth, luna, 8-1-32; moth, Pandora, 12-3-158; moth, tussock, 9-4-227; tree hoppers, 2-4-229; tree hopper, buffalo, 11-4-250; walking leaf, 15-4-221; weevil, hazelnut, 3-6-371. See reference list for additional help. *General References.*—Pages 339-353; 358-363.

Suggestions for First and Second Grades.—A few of the insects and other small forms of life to be found on trees and shrubs are so conspicuous as to appeal even to children of these grades. The large moths are always attractive when seen, the tents of tent caterpillars otherwise. The songs of cicadas are generally to be heard before school closes in spring and after it opens in the fall. They are replaced at night in the fall by the calls of katydids. Among all of these things there is a fund of material from which the early grade children may enrich their experience. Egg masses of many kinds of these insects may be collected and started in their development in schoolrooms.

Suggestions for Third and Fourth Grades.—The manner in which these creatures which live off the ground manage to go about their affairs is highly varied. Some fly, others jump. Some drop and others move very little and an examination of almost any tree will find representatives of at least one of these groups present at almost any time of year. It is not impossible to draw here some conclusion as to whether or not the species found are injuring or helping the tree. In this connection refer to the section on preying insects. The life history of at least one form to be found on trees should be shown either by explanation or by actual observation.

Suggestions for Fifth and Sixth Grades.—Some suggestions as to means of controlling undesirable representatives of this group should be given. This will require knowledge as to how the creatures protect themselves both during their destructive periods and at times when they themselves may be either destroyed or prevented from reaching the trees. The paraphernalia attendant upon spraying fruit and shade trees, the use of sticky bands about the trunks of trees, and similar things, may constitute profitable sources of study.

Insects and Their Kin on Low Plants

Nature Magazine References.—General, plant traps, 2-1-45; nectar thieves, 2-2-86; beetles, ladybird, 10-4-249; 12-5-304; beetles, red milkweed, 10-1-39; bumblebees, 8-1-32; butterfly, monarch, 2-2-93; 8-1-31; butterflies and moths, 10-3-184; butterfly, cabbage, 15-2-84; fly, drone, 8-1-31; fly, narcissus bulb, 12-2-117; galls, rose, 10-3-170; grasshopper, 15-5-322; 15-6-379; moths, sphinx, 10-6-356; 11-2-94; pests, garden, 10-1-17; 15-2-84; pests, garden, trapping, 11-2-103; snails tongue, 1-3-51; spittle-insects, 7-6-371; spider, cobweb, 2-1-11; spider, orb-weaver, 9-6-371; squashbug, 8-1-28, and many of the general articles appearing frequently in the magazine. *General References.*—Pages 339-353; 358-363.

Suggestions for First and Second Grades.—All of our low plants have some small forms of animal life that prey upon them. These may be slugs, or insects, or other creatures and it is concerning a general appreciation of this fact that this section is included. A recognition of a few garden pests may be sufficient for the lower grades. There are plenty of interesting things to see in the way snails get into their shells, the way leaf hoppers and grasshoppers hide behind plants, and the like that make observations in this field useful for work later on.

Suggestions for the Third and Fourth Grades.—The problem of keeping garden or house plants free from the attacks of the creatures here considered may be the vehicle used in teaching about these creatures. At any rate the essence of the life history of a few of the different types should be made available to all people who in the future are to have anything to do with the culture of plants either in flower gardens, flower pots or on a large agricultural basis. The recognition of the two main methods by which these creatures eat, namely, chewing and sucking, should be considered and an appropriate activity would be attempting to classify as many as possible of the things found feeding on garden plants on this basis. This is more important than naming the creatures.

Suggestions for Fifth and Sixth Grades.—Definite means for controlling the activities of the species found should be presented. This may require rather detailed life history information, much of which will probably be found most conveniently outside of the pupil's own experience. Instruction in the mixing and application of sprays may not be inappropriate. The migration of a certain species like the monarch butterfly and the means by which other species bridge the winter season should be mentioned.

Insects and Their Kin (Invertebrates) Found on and Under the Ground

Nature Magazine References. — Ants, 1-5-8; 1-6-22; 5-4-219; 7-6-342; 15-2-123; 15-4-229; ants and the community idea, 6-4-217; cave cricket, 8-6-339; cricket, 8-1-32; cockroach, 4-4-239; earthworm, 8-2-89; glow-worm, 14-4-233; 15-3-195; Hercules beetle, 9-1-27; mole cricket, 15-4-244; snow fleas, 6-6-349; spider, black widow, 14-3-152; tarantula, 14-2-107, 15-3-197; termites, 13-2-84; tiger moths and woolly bears, 9-6-353. Many others are mentioned in the more general articles. *General References.*—Pages 339-353; 358-363.

Suggestions for First and Second Grades.—No matter where a child may live there will probably be opportunity for him to study first hand a living representative of this group. Ants and cockroaches and crickets are not limited in their distribution. If to this are added the snails, millipedes, worms, white grubs and the like which may be turned up by almost any garden spade, there is ample opportunity for learning in new fields. If the proper information is not easily available about the habits of these creatures false ideas will probably creep in. Most of these creatures readily become pets.

Suggestions for Third and Fourth Grades.—Get some idea of the interrelationships which exist between the forms of animal life found in this type of environment. This may be between different forms or it may, as in the case of the ants, be between different individuals of a colony. Make an ant nest such as is suggested in any of the numerous general insect references, and from this learn the division of labor which exists in a colony. In the " Fieldbook of Nature Study," listed in the references, detailed information appears on forms such as slugs, snails, sow bugs, earthworms and many others that are not generally included in nature texts, though they may appear in almost any spadeful of garden soil. The seasonal appearance of the species may be recorded as is done with birds.

Suggestions for Fifth and Sixth Grades.—The means of protecting root crops from the attacks of the forms here considered should be presented. This requires some knowledge of the monthly migration of the creatures. In some cases this is not like the migration of birds north and south, but rather from the soil surface to deep in the soil. Plowing practice may do much to upset the plans of such forms (providing they do have plans) and assist in protecting desirable plants from injury by them.

Preying Insects and Their Kin (Invertebrates)

Nature Magazine References.—General, 2-3-154; ant-killer, 13-4-246; beetles, 10-4-249; 12-5-304, 14-5-281; chigger, 4-4-232; flies, 13-3-154; 14-5-281, giant water-bug, 15-3-152; mantis, 14-5-281, 15-1-62; mud-dauber wasp, 2-4-197; praying mantis, 6-2-89; pseudo-scorpions, 4-2-171; spiders, 11-3-156, 11-3-187; stink bugs, 14-5-281; tarantula hawk, 15-3-197; tiger beetles, 14-5-281; water scorpions, 14-5-281; wheelbug, 14-5-281; wasps, 10-2-99; 13-3-154; 14-3-176; 14-5-281. Many others are mentioned in general articles in the magazine. *General References.*—Pages 339-353; 358-363.

Suggestions for First and Second Grades.—Why we should fill our children's minds with stories of tigers and neglect consideration of many of the diminutive preying creatures is rather strange to understand. One does not wish to encourage bloodthirstiness, particularly in children, but there are two ways in which one may look at the problem of small preying creatures. One of these refers to the protection these creatures give us through the destruction of our enemies. They offer the best example of the foolishness of following up a desire to kill all insects, and may be used as a check on inhumaneness, since it can be pointed out that they are worthy of protection because of the good they do us. The list given above might be amplified to include almost all animal pests.

Suggestions for the Third and Fourth Grades.—The suggestions given above lend themselves easily to amplification in a field so rich with examples. It is not desired that specific examples be followed, but the story of the mud-dauber wasp or some one of its relatives might well be understood. An explanation as to why one should or should not encourage these creatures might well enter into language lessons. A praying mantis under a glass tumbler will itself teach a useful lesson, if it is supplied with houseflies.

Suggestions for Fifth and Sixth Grades.—The story concerned with the introduction of insects from foreign lands without the introduction of their natural enemies is instructive, dramatic, economic and vital to our happiness. It should not be omitted from consideration in our school system. Individuals without this appreciation may thoughtlessly upset the good done by many others, through accidentally freeing a creature which might develop into a pest. The story of how preying insects and their kin help us should be given.

MAMMALS, FISH, REPTILES AND AMPHIBIANS

Nature Magazine References.—How to study mammals, 3-2-108; color, 8-3-141; scent, 7-3-153; sound, 7-5-279; taste, 8-1-36; touch, 8-6-332; thrift, 7-1-53; lost species, 9-1-33; myths, 1-2-34; 1-6-54; 6-5-291; 7-1-42; 8-5-281; ingenuity, 8-4-229; sanctuary, 2-3-139; 3-4-227; 5-2-113, 114; 5-2-117; 5-4-241; 5-5-307; 7-5-305; California mammals, 12-4-259; Florida mammals, 14-6-338; tropical mammals, 15-1-11; tracks of mammals 15-3-170; mammals of the Lake States, 15-5-302; conservation, 10-6-375; 15-1-9, 44; 15-2-116; flood toll, 10-1-11, 31; puzzles, 10-3-194; 11-1-26; value, 12-6-357, and others under the separate headings. *General References.*—Pages 339-353; 363-366.

This group includes all animals with backbones except the birds. It is admittedly a rather arbitrary group and might be divided into smaller groups most conveniently. One of the values of studying its representatives lies in the fact that it offers splendid variety for the study of the story of the way animals protect themselves and reproduce their kind. No one group or species can tell the whole story, but together they make splendid illustrative material.

The representatives of no other big group here considered offer greater opportunity for teaching lessons in humaneness, since these animals respond favorably or unfavorably to treatment much as we ourselves do. This is, of course, more evident in the higher groups than in those that are considered more primitive.

While migration stories are a bit more spectacular among the birds, there are still valuable stories to be found in the life histories and migrations of fish, mammals and even the amphibia. As was the case with the birds, knowledge concerning these migrations is highly valuable in determining treatment of the animals concerned, if a continued supply is to be desired on economic or other grounds.

The economic contributions of members of this group vary from those that are themselves of value as food to those that interfere seriously with plants which are desirable to us as food. In addition, furs, hides, bones and oils are products which enter into our everyday life and can be better appreciated through an understanding of the lives of the creatures responsible for them. Man's record of dealing with the natural supply of many of these creatures in the past has not infrequently lacked intelligence, and so an understanding of the laws now in vogue for this protection is to be desired. This is so, not only that present laws may be obeyed, but that we may evolve more satisfactory laws in the future.

Fish

Nature Magazine References.—General, 1-2-45; aquarium, 8-5-271; aquarium fish, 10-1-34; 11-5-325; 12-5-286, 305; 14-4-208; brook fish, 11-5-289; coral reef fishes, 7-5-267; curious fish, 3-4-221; deep sea fish, 12-3-179; 13-5-325; fossil fish, 12-5-332; fish and oil supply, 3-2-104; fish puzzles, 5-6-382; game fish, 10-3-161; 11-6-382; 13-4-219; 14-6-345; 15-2-107; 15-5-315; general marine fish, 6-3-145; 6-5-277; general aquarium fish, 3-6-343; hatcheries, 15-2-107; stocking, 11-1-37; 15-2-107; 15-5-315; alewives, 9-6-363; albino trout, 15-1-58; angler fish, 11-3-181; black bass, 7-5-267; catfish, 11-5-289; codfish, 2-3-175; climbing perch, 1-1-7; darters, 2-3-138; guppies, 12-5-305; grayling, 14-3-158; 15-4-259; 15-5-315; lampreys, 1-1-55, 11-5-289; minnows, 8-2-83, 11-5-289; pickerel, 15-6-368; salmon, 2-6-342; 4-6-337; sculpin, 5-3-179; sharks and kin, 7-1-26; smelt, 6-4-204; steelheads, 5-1-37; 5-2-101; 11-5-289; sticklebacks, 11-5-289; suckers, 11-5-289; sunfishes, 11-5-289; trout, brook, 3-5-283; trout, lake, 15-5-315; viper fish, 11-4-224; whitefish, 15-5-315. *General References.*—Pages 339-353; 365, 366.

Suggestions for First and Second Grades.—These youngsters may study goldfish in an aquarium if they cannot study other fish in their natural environment. It might be well for them to determine, if possible, which fins are used for such various purposes as moving forward, upwards and so on. A suggestion as to why the mouth of the species studied is placed and shaped as it is should not be too difficult. The needs of fish in respect to food and the proper kind of water are worthy topics of study.

Suggestions for the Third and Fourth Grades.—The fish puzzles suggested above may lead to a number of interesting problems, some of them capable of being solved by these children and others too difficult. They emphasize at least the relationship between structure and habits which is often so evident in fishes. This, of course, carries on to the food problem and leads to an understanding to some degree of the life history, which, of course, is the key to the culture of those fishes worthy of protection.

Suggestions for Fifth and Sixth Grades.—Few topics of science offer better opportunities for understanding the interdependence of various species than does fish study. Life for fish as for many other forms is apparently a struggle to eat and keep from being eaten. If they succeed in this they may reproduce, even though they may have to migrate great distances to do so. The migration stories, the parental care shown by some species, and the laws which have been evolved for the protection of food species furnish ample material for useful study.

MAMMALS

Mammals of the Waterways

Nature Magazine References.—Bear, polar, 1-1-31; 7-5-288; beaver, 1-1-3; 2-4-221; 5-4-217; 8-5-288; 11-3-149; 14-1-34; 15-5-289; fisher, 10-6-375; manatee, 14-6-338; marten, 10-6-375; mink, 1-4-17; 8-5-288; 14-6-338; muskrat, 6-1-29; 8-5-288; 9-3-171; otter, 4-4-237; 10-6-375; 14-6-338; raccoon, 14-6-338; 15-5-302, 324; seal, 6-4-226; 12-5-310; sea elephant, 8-3-167; sea otter, 5-3-169; sea-lion, 4-4-203; weasel, 11-3-192; whale, 4-4-208; whale, booming, 14-2-80. This might also well include our common rats, that are probably the commonest mammals to be found along our waterways, particularly near centers of population. Their tracks in the mud are generally easily found. A few other mammals like raccoons and bears and cats frequently come to waterways to feed, though they are not themselves essentially aquatic. *General References.*—Pages 339-353; 363-365.

Suggestions for First and Second Grades.—It will probably be difficult for any great number of first and second grade children to see many of these mammals alive and active in their natural environment. Their skins, when made into furs, are to be found everywhere at almost any time of the year. From these furs may be told the story of the animals that produced them.

Suggestions for Third and Fourth Grades.—Though it may not be popular, the story of how raw furs are produced largely through the use of the inhumane steel trap should be introduced. If we teach the steps in the production of wool garments, of silk, and of linen, why should we avoid doing the same for the production of luxuries like furs, unless we are ashamed to tell the story? The Anti-Steel Trap League of Washington, D. C., has interesting literature on the subject, whose worth you may judge for yourselves. Suggestions for the production of furs on fur farms should be made.

Suggestions for Fifth and Sixth Grades.—The story of fur farming, of the seal industry is not only interesting but profitable in many ways. The wisdom of trapping to extinction, granting that trapping is humane, should be considered. The local game laws and trapping laws should be put to the test both from a humane and from the practical standpoint. Great changes have been made in laws governing the killing of birds for use as ornaments. It is not impossible to assume that similar changes may be made to affect mammals. Be sure to emphasize the good done by many of these mammals as rodent destroyers.

Small Mammals Commonly off the Ground

Nature Magazine References.—Bats, 10-4-262, big brown, 1-5-48; fisher, 4-6-346; opossum, 2-1-5, 2-3-171, 4-5-273, 8-5-288, 15-5-302; Honduras opossum, 9-2-103; porcupine, 1-2-19, 3-3-133, 5-1-25; rodents, 2-5-289; squirrel, flying, 3-4-205; 11-2-126; squirrel, albino gray, 14-2-111; squirrel, gray, 1-1-33, 2-2-122; squirrel, Carolina gray, 5-5-303; squirrel, fox, 15-5-302; squirrel, red, 5-3-141; 6-4-220; 9-4-245. Raccoons and deer mice listed as being on the ground might safely be considered under this heading, also. *General References.*—Pages 339-353; 363-365.

Suggestions for the First and Second Grades.—All of these creatures that live much of their lives away from the ground in the trees and even in the open air have to be " made " differently from those that have no possibility of falling off the earth. These modifications are primarily in the limbs, though tails frequently enter into the problem. It is hoped that every first grade child may have the opportunity of observing how some one of these creatures is able to make his way in his chosen environment. The food habit of bats can at least be suggested, to avoid the popular false impression gaining a foothold.

Suggestions for Third and Fourth Grades.—Most of these creatures are most adept in protecting themselves, though they may live in more or less exposed tree tops. Listing the various means employed by those which may be observed is desirable. Further opportunity for interpreting the use of tails by these animals should be given. Many of these will have means of communication one with another, which may be interpreted. Tracks in the snow of these creatures and of those found on the ground are worthy problems for solution. In this connection see *Nature Magazine,* 3-1-11 and 7-2-108, Palmer's " Fieldbook of Nature Study " and other references.

Suggestions for Fifth and Sixth Grades.—If possible, campaigns to encourage the presence of useful species should be undertaken. It should be recognized that in this group are creatures which feed by day and others by night, forms which feed on plants and forms which feed upon animals, and that between them exists a balance which influences the prosperity of those things which we get from trees and elsewhere. Get bat information straight at least.

Small Mammals On or Under the Drier Ground

Nature Magazine References.—General, 1-1-39; 11-1-13; Arizona, 11-2-102; New England, 13-5-311; Sierran, 12-4-251; flood damage among, 10-1-31; wee animals, 11-6-354; anteater, great, 4-3-158; armadillo, 5-6-361; badger, 4-5-285; 8-5-288; 10-6-375; cat, ring-tailed, 10-6-375; chinchilla, 8-6-344; chipmunk, 10-2-123, 15-6-359; chipmunk, Townsend's, 8-5-288; coyote, 5-4-233; 15-5-302; fox, arctic, 10-6-375; fox, gray, 10-6-375; fox, kit, 10-6-375; fox, red, 1-4-10; 8-4-161; 10-6-375; fox, silver, 7-2-73; gopher, pocket, 11-6-354; ground squirrel, Richardson's 8-2-105; ground squirrel, side-striped, 6-5-281; hare, snowshoe, 11-5-320; hare, varying, 7-4-228; kangaroo rat, 4-3-180; 9-1-13; lemming, 11-6-354; marmot, 1-3-13; 11-1-9; 15-1-36; 15-4-262; 15-5-302; marmot, mountain, 7-6-355; mole, 3-5-289; 11-6-354; mouse, apple, 4-1-51; mouse, meadow, 11-6-354; mouse, white-footed deer, 2-4-245; 8-4-233; 11-6-354; mountain beaver, 8-3-165; pangolin, 9-3-153; prairie dog, 6-3-135; rabbit, antelope jack, 6-2-110; rabbit, cottontail, 7-2-108; 8-5-288; 10-3-192; rabbit, jack, 9-3-176; raccoon, 2-1-34; 8-5-288; 10-4-230; rodents, 2-5-289; 14-3-155; shrew, short-tailed, 11-6-354; 15-4-241; skunk, 2-1-32, 24; 4-3-141; 7-5-275; 8-5-288, 15-4-243; 15-5-302; 15-6-408; skunk, little spotted, 10-6-375; spermophile, 15-5-302; squirrels, flag, 14-2-86; ground, 11-1-9; 11-2-117; 15-6-359; weasel, 8-5-288; 10-5-327; 13-1-32; weasel, arctic, 10-6-375; wolf, 2-6-333; 5-5-285; 7-3-156; wolverine, 5-1-14; woodchuck, 8-3-140; 8-4-201; 8-5-281, 288. Information on shrews may be found elsewhere. *General References.*—Pages 339-353; 363-365.

Suggestions for First and Second Grades.—The host of small mammals of the drier ground cannot help but hold interest for small children. Some feed on and some under the ground. Some eat plants and some animals. These differences are reflected in structural variations which will raise all sorts of interesting problems. Many of these creatures make very interesting pets, particularly when young.

Suggestions for the Third and Fourth Grades.—If it is not possible to study parental care as exhibited by members of this group in the earlier grades, it may be profitably brought in here. The number of litters and the size of the litters may be brought up, as basic for understanding the general economy of the forms later on. Tracks in the snow should be studied.

Suggestions for the Fifth and Sixth Grades.—If food habits have not been appreciated before they should be emphasized here, in an effort to strengthen the appreciation of the work done by these mammals, whether the work is for our good or not. The factors in the success and failure of the species to multiply may be considered. There are also certain laws governing the killing of many of these mammals for fur or for other purposes which should be presented at this time. These are of course local and should be so considered.

Big Game

Nature Magazine References.—General, 1-1-39; 1-2-13; 2-3-133; American cat family, 11-3-146; 15-2-75; big game of Mexico, 4-4-213; big game of Yosemite, 8-1-9; big game and the forest ranger, 4-6-363; Florida mammals, 14-6-338; mineral licks, 13-3-147; antelope, 2-2-121; 3-2-69; 12-3-149; 15-1-9; 15-6-363; bear, 5-6-347; 12-3-145; 12-1-21; bear, Alaskan brown, 6-4-212; 12-3-145; bear, black, 1-3-27; 1-5-42; 2-3-157; 2-6-359; 12-3-145; 15-5-302; bear, glacier, 12-3-145; bear, grizzly, 11-3-162; 12-3-145; bear, polar, 1-1-31; 7-5-288; 12-3-145; 13-2-88; bear, spectacled, 12-3-145; bison, 1-2-13; 3-5-267; 10-4-217; bobcat, 1-3-30; 5-1-33; 11-3-146; 15-5-302; buffalo, 5-2-111; 1-6-12; caribou, 4-6-328; 8-4-218; cougar, 1-1-29; 4-1-5; 4-2-69; deer, 1-2-115; 2-3-144; 3-6-325; 4-2-79; 5-1-5, 5-3-158; 7-6-337; deer, mule, 12-1-21; 11-5-299; deer, white-tail, 12-3-170; 15-4-264; 15-5-302; elk, 1-2-14, 58; 5-2-69; 10-6-351; 15-4-262; 15-5-302; gemsbok, 7-1-44; jaguar, 6-1-15; 11-3-146; lynx, Canada, 11-3-146; moose, 3-6-325; 6-6-345; 13-4-223; 15-5-302; mountain goat, 6-3-167; 11-2-88; 13-6-401; 15-3-153; mountain sheep, 11-1-9; 15-3-153; musk ox, 7-1-10; 13-2-88; ocelot, 11-3-146; Ovis poli, 6-4-208; puma, 11-3-146; seal, 13-2-88; sheep, 1-2-14; 1-6-46; 8-1-53; walrus, 1-3-58; warthog, 2-4-233; wild boar, 2-2-91; wolf, 11-2-81; yagouaroundi, 11-3-146. *General References.*—Pages 339-353; 363-365; 387, 388.

Suggestions for the First and Second Grades.—Merely to recognize these animals when seen is probably adequate for first grade activity. Many children through their toys and books have been able to do this to a considerable extent prior to coming to school. In fact they can probably do this better for foreign beasts than they can for some of the animals that live in their own back yards. It is suggested that first and second grade children observe any peculiar means of locomotion employed by the animals which may be observed, and if possible make an attempt at imitation of the various means employed.

Suggestions for Third and Fourth Grades.—Food habits are always appropriate study for these grades. From a study of the body markings, it might be well to introduce here an attempt to interpret the probable type of environment in which the animal observed lived naturally. Tigers, leopards and other forms lend themselves to this.

Suggestions for Fifth and Sixth Grades.—The care of zoo mammals, whether it is watering elephants or feeding peanuts to monkeys, is always interesting. It is, however, much more of a problem than that just indicated, and comparatively few people have signal success in keeping any except the most hardy species healthy. The environment of a zoo is essentially unnatural and produces abnormal conditions in the inmates. Learning how the best results are to be secured is a worth while endeavor for children of these grades.

Zoo Animals

Nature Magazine References—General, 1-2-25, 14-3-146; collecting, 10-5-281; photographing, 13-1-51; Washington National Zoological Park, 11-2-108; Watertown Park Zoo, 10-1-67; apes, 14-5-273; baboons, yellow, 11-1-20; coati, 7-3-137; caffre cat, 12-6-354; cheetah, 12-6-354; elephant, 6-2-79, 10-3-147; giraffe, 11-2-106; gorilla, 8-2-113; howling monkey, 6-6-339; hyena, 12-2-100; leopards, 12-6-354; lions, 12-6-354; marmoset, 7-2-87; mongoose, 11-3-172; monkeys, 9-4-250; protection of captivity, 2-2-69; puzzles on mammals, 5-3-186; rhinoceros, 12-3-165; sea lions, 14-4-236; tigers, 12-6-354; warthog, 11-5-312. See also Big Game references. *General References.*—Pages 339-353; 363-365; 387, 388.

Suggestions for all Grades.—It is hardly profitable to suggest that any concerted study of zoo mammals should be undertaken except where zoos are easily accessible. For that reason this section of the outline is inserted as optional. Where zoos may be visited it would of course be unfortunate to pass up the opportunity of observing these animals at close range which such a situation offers.

Suggestions for the First and Second Grades.—Merely to recognize these animals when seen is probably adequate for first grade activity. Many children through their toys and books have been able to do this to a considerable extent prior to coming to school. In fact they can probably do this better for foreign beasts than they can for some of the animals that live in their own back yards. It is suggested that first and second grade children observe any peculiar means of locomotion employed by the animals which may be observed.

Suggestions for Third and Fourth Grades.—Food habits are always appropriate study for these grades. From a study of the body markings, it might be well to introduce here an attempt to interpret the probable type of environment in which the animal observed lived naturally. Tigers, leopards and other forms easily lend themselves to this sort of thing. It might even be given as an assignment in language for children to write their opinions in this matter, though this, too, may be more profitable and appropriate in upper grades.

Suggestions for Fifth and Sixth Grades.—The care of zoo mammals, whether it is watering elephants or feeding peanuts to monkeys, is always interesting. It is, however, much more of a problem than that just indicated, and comparatively few people have signal success in keeping any except the most hardy species healthy. The environment of a zoo is essentially unnatural and produces abnormal conditions in the inmates.

Domestic Mammals

Nature Magazine References.—Barnyard pets, 15-2-82; burro, 6-6-365; cat, 6-6-338; 7-1-19; 7-4-203; 8-6-347; 10-2-95; 15-1-37; cattle, 3-4-213; dogs, 10-2-79, 95; Airedale terrier, 6-4-201; Arctic dogs, 6-2-75; Boston terrier, 7-6-335; 13-1-26; dog, collie, 5-2-79; 12-6-378; dog, Doberman Pinscher, 13-6-387; dog, English setter, 5-3-145; dog, fleece-bearing, 14-3-177; dog, German shepherd, 6-6-329; dog, Irish setter, 14-1-40; mongrel, 8-5-265; dog, Pekingese, 14-3-145; dog, pointer, 5-6-374; dog, puppies, 8-3-151; dog, Schipperke, 12-5-303; dog, Scottish terrier, 5-4-211; dog, Siberian, 10-6-362; dog, white house, 7-4-203; dog, tricks of, 9-4-219; donkey, 13-4-247; horse, 15-3-167; sheep, 3-2-73. Horse, pig and goat references elsewhere. *General References.*—Pages 339-353; 363-365.

Suggestions for First and Second Grades.—The recognition of the chief points of difference between cats, dogs, horses, pigs, cattle, sheep and goats, preferably through actual observation, otherwise through pictures, is profitable activity for these grades. Means of encouraging friendly relations between ourselves and these animals is worth while. Individuals among humans as well as individuals among these animals do not seem to have the ability to be friendly. A brief study of how these animals walk and run might be brought up in connection with a study of their tracks, but this is more appropriate in higher grades.

Suggestions for Third and Fourth Grades.—The differences in the feet of these animals is worthy of notice, in connection with a study of their teeth and food habits. Study of the teeth of pets is easier than the study of the teeth of living wild animals, and there is sufficient variety represented among our mammal pets to help in an appreciation of the use of the various teeth in our own jaws. Certain of them emphasize canine teeth, certain others the incisors, and so on. Plaster casts of the tracks of these mammals may prove worth while and easy to secure (see *Nature Magazine,* 6-6-368).

Suggestions for Fifth and Sixth Grades.—Study the care of these animals. If possible have one child of the class report on how this is actually being done, if it is not possible for all to engage in this activity. In many of the large cities domestic animals are cared for directly in connection with school gardening work and similar activities. The economic value of cats should be considered without sentiment, and, if possible, the laws governing stray cats should be understood. New York State has a model law in this respect.

AMPHIBIANS

(Frogs, Toads and Salamanders)

Nature Magazine References.—Amphibia puzzles, 6-1-50; frogs, 3-5-274, 11-3-180, 15-1-39, 57; frog, albino, 15-1-39; frog, bull, 5-6-373, 15-3-158; frog, Jamaica tree, 13-2-110; frog, leopard, 15-3-158; frog, spring, 5-3-232; frog, spring peeper, 15-4-219; frog, tree, 11-6-359; frog without tadpole, 8-1-13; toad, 7-1-35; 14-4-239; 10-1-55; toad, Darwin's, 15-4-269; toad, fire, 10-1-61; toad, tree, 11-5-297; newt, 3-1-50, 3-3-169. See also "The Frog Book," by Dickerson, published by Doubleday, Page and Co., "Frogs: Their Natural History and Utilization," by A. H. Wright, *Document* 888, Department of Commerce, Washington, D. C., and for frogs and salamanders "The Fieldbook of Nature Study," by Palmer and "The Handbook of Nature Study," by Comstock. *General References*—Pages 339-353; 365, 366.

Suggestions for First and Second Grades.—The means of locomotion employed by amphibia is as varied as is the environment which they occupy. First grade children can recognize that all of these creatures do not spend their entire lives in ponds, as many adults seem to think. Toads, wood frogs, tree toads, meadow frogs and bullfrogs all occupy essentially different kinds of country during most of their lives. This can and should be recognized by the youngest children. The brief story of the creatures from eggs through tadpoles to adults may be given.

Suggestions for Third and Fourth Grades.—The life history of a salamander and of a frog or toad may be given in brief, or the food habits of various forms suggested may be further emphasized. The methods of self protection employed by practically all of the animals of this group are splendid topics of consideration. We can walk into a swamp in which there are thousands of spring peepers and be lucky if we see one. The calls of frogs and toads are also worth study. The males alone call and each kind has a rather easily distinguished call once it has been given any study. Begin with toad calls and distinguish others from its trill.

Suggestions for Fifth and Sixth Grades.—The economic value of amphibia has been woefully neglected in nature education. Essentially useful, as all species are, we have allowed them to be killed and practically exterminated in some species because of a fancied superior food value of their legs. The commercial food value has led to frog farms which might be studied. The laws protecting many species should be considered.

REPTILES

(Turtles, Snakes, Alligators and Lizards)

Nature Magazine References.—General, harmless snakes, 11-4-227; 15-3-161; mythical serpents, 10-4-240; snake pet, 8-6-361; playful snakes, 15-3-200; prehistoric reptiles, 5-3-178; 8-1-35; 8-2-91; 8-3-163; 8-5-280; 8-6-348; 9-1-35; 9-5-297; reptiles of Panama, 6-3-153; reptile puzzles, 6-2-116; 10-3-194; snakes vs. spiders, 15-4-234; alligator, 2-1-8; 8-2-116; chameleon, 9-6-362; 11-6-395; chuckwalla, 14-4- 218; cobra, 2-2-105; fence lizard, 8-2-116; glass snake, 8-3-164; gila monster, 4-1-26; horned toads. 1-6-53; 7-2-94; 10-1-41; iguana, Jamaican, 4-4-241; lizard, 11-1-46; 15-1-11; 15-3-169; snakes, black, 15-3-161; blue racer, 15-1-58; snake, bull, 1-1-9; snake, copperhead, 1-1-11; snake, De Kay's, 15-3-161; snake, garter, 8-2-116, 15-3-161; snake, hog-nosed 1-1-12, 15-3-161; snake, king, 14-3-143; 15-3-161; snake, milk, 8-2-116; 15-3-161; snake, pine, 1-1-9; snake, cattle, 1-1-11; 14-2-108; 14-3-143; 15-1-58; 15-3-161; snake, rattle, Pacific, 10-5-297; snake, ribbon, 15-3-161; snake, ring-necked, 15-3-161; snake, water, 15-3-161; swift, 8-2-116; tortoise, desert, 9-4-252; turtles, 5-2-85; 9-2-87; turtle, box, 10-3-151; turtle, desert, 12-6-372; 15-1-43; turtle, Florida, 15-1-25; turtle, Galapagos, 12-5-322; turtle, Loveridge, land, 11-5-306; turtle, loggerhead, 14-1-44; turtle, painted, 8-2-116; turtle, pond, 14-5-302. *General References.*—Pages 339-353; 365-366.

Suggestions for First and Second Grades.—There is no reason why, except where poisonous snakes are common, a first grade child should not have a pet snake as well as a pet rabbit. A pet turtle of a gentle species, or a pet lizard may enjoy the same privilege. Unfortunately most of these creatures are not popular with the average adult, though most of the creatures are essentially useful. Merely to allay fears held for these creatures is worth while.

Suggestions for Third and Fourth Grades.—A turtle, a snake and if possible a lizard of some sort should be familiar to each child of these grades. The means by which these creatures move, feed and protect themselves are so unique as to be in some instances spectacular. A pet milk snake or fence lizard or painted turtle makes an ideal pet if properly treated. The fact that the lizards vary in accordance with whether they live in trees, on the ground or underground should be brought out.

Suggestions for Fifth and Sixth Grades.—The life history story of these species is worth study. The lizards, turtles and some of the snakes lay eggs, while the other snakes give birth to living young. This may be demonstrated with living snakes in a vivarium in the schoolroom in the fall, at least with some of the snakes. The economic story back of the creatures should be considered.

A NATURE BIBLIOGRAPHY

E. Laurence Palmer and Eva L. Gordon

It is only with fear and trembling that an honest person can attempt to write a bibliography. This is particularly true of a nature bibliography. The selections made have many limitations. On one side, the reviewers are limited by the opportunity they have to see books. On another, the writers must admit the limitations of their experiences. On still another score, there must be admitted the difficulty of securing certain factual material involving exhausted editions, change in price and even the existence of suitable books to meet certain well recognized needs.

In the writing of this bibliography, the authors have spared no efforts that might make the work meet the needs for which it was prepared. The books have been examined critically by one or the other of the writers. Published complimentary reviews of certain books have not been accepted on their face value in lieu of an actual examination and because of this, many books which might otherwise be included are omitted. The writers make no apologies for these omissions since in every case there has been a just reason for exclusion. Books which contained any considerable amount of untrue information were automatically dropped from the preliminary list. Except in a few cases books that were deemed to be too technical for the lay reader or for use in schools below the college level were also omitted. Books which have become out of print prior to January, 1930, even though they may be highly valuable are not included in the present list.

The writers admit great difficulty in drawing the line as to what may be considered good nature literature and what may be considered bad. They believe that Kipling's " Jungle Books " and his " Just-so Stories " may exert a decidedly useful influence in making a child nature-minded but they do not include these books in the present bibliography because of the too imaginative treatment given many of the leading characters. They feel that A. A. Milne's " The House at Pooh Corner " may do a great deal to make a child feel kindly towards dumb animals and should find a genuine place in any child's reading. They fail to see, however, where it or the other accounts of Christopher Robin and his immortal friends can, without an argument, be considered as nature literature. The writers of this bibliography, have automatically drawn a line which excludes such delightful stories about nature things as appear in the tales of Uncle Remus and they have also excluded stories in which conversation between animals is the outstanding theme or vehicle of expression. This excludes many excellent stories written by Thornton Burgess without any thought of classifying them with the entirely imaginative and, for our purposes, useless though admittedly interesting adventures of the beloved Uncle Wiggily. The writers admit some merit in this type of literature and include " The Burgess Bird Book " and " The Burgess Animal Book " because of the fact that the essential content of these books accords with the facts which they pretend to present. They also admit the fairy stories about bees and ants told by Mrs. Phillips because of the way in which the general impression received from reading these books accords with the facts about ants and bees.

Not a few excellent bits of nature literature have been excluded because of the fact that the kinds of things treated are not native to the United States and probably will not be seen in the wild state by the average user of the bibliography. The inclusion of accounts of a few exotic species has not resulted in the exclusion of a book but books dealing entirely with foreign species have not received favorable consideration. A few books are included that have a bearing on American animals as they were thought of by primitive Americans. In most cases, these Indian legends do not represent facts about the characters described but the facts given were accepted as truth by those to whom they were originally told. The writers recognize a difference between these stories based upon the ancient folk-lore of our early Americans and the nature fake stories told by many of our modern writers. A few of the former and none of the latter are intentionally included.

With few exceptions, the present bibliography does not list short bulletins. These have been included only where similar useful literature could not be found in permanent form. The present list does not attempt to list supplementary, free and advertising material which is entitled to a place in any nature or science library. This service has been satisfactorily performed by Woodring, Oakes and Brown's " Enriched Teaching of Science in the High School." There is no need for its being duplicated in the present work. The writers have not attempted to make recommendations for the purchase of particular books where a limited budget is available. This has been done with good judgment by Dr. Hanor Webb of George Peabody College for Teachers in the " Peabody Journal of Education."

The writers do not profess that the section on poetry is exhaustive but do believe that it represents some gems of nature in verse.

Ordinarily age has not been a criterion for inclusion or rejection of a book from this list. Where an old book covers the field more satisfactorily than a recently published book the older book has been included if it is still in print. One old book was listed deliberately because of the contrast between the present and past in the matter of certain inventions.

The books marked " J " are deemed to be suitable for use by juveniles or children below junior high school age. The figure following the letter J indicates the public school grade for which the book was planned. About one out of five of the books examined critically are included in the list. Some books with state adoptions are omitted because of considerable lack of scientific accuracy in the content. Books marked " JHS " are deemed to be suitable for children of junior high-school age. Those marked " HS " are deemed suitable for those of high school age. Those marked "C" are books of college grade. The mark "A" after the name of the book indicates that it seems that it may be read with profit by adults and persons of high school age.

Readers of this bibliography may be assured that it represents much more than a mere listing of available book titles. It is a sincere effort to select reliable nature and science literature for the group for which it is intended, keeping in mind the needs of individuals in all parts of the United States. The lists in the different departments have been submitted to specialists in the pertinent fields of science and the judgment of these specialists has been added to that of the writers. There is no doubt but that the present bibliography is much superior to that which appeared in the first edition of *The Nature Almanac.*

PHILOSOPHY AND METHOD

Bailey, L. H.: "The Nature-Study Idea," The Macmillan Co., 60 Fifth Ave., New York City. Revised edition, 1909, 246 pp., $1.90, A. A philosophical trail-blazer of nature education.

Bailey, L. H.: "The Outlook to Nature," The Macmillan Co., 60 Fifth Ave., New York City. Reissued, 1924, 195 pp., $1.50, A. Lectures on "The Realm of the Commonplace," "Country and City," "The Schools of the Future," "Evolution," "The Quest for Truth."

Billig, Florence G.: "A Technique for Developing Content for a Professional Course in Science for Teachers in Elementary Schools," Bureau of Publications, Teachers College, Columbia, New York City. 1930, 101 pp., $1.50, A.

Carr, William H.: "Signs Along the Trail," 1927, 30 pp., A. "Trailside Conversations," 1930, 36 pp., A. Department of Education, American Museum of Natural History, 77th St. and Central Park West, New York City. Useful to anyone who is planning a nature trail.

Cawthorne, Henry H.: "Science in Education," Oxford University Press, 114 Fifth Ave., New York City. 1930, 110 pp., $2.00, A. An excellent series of lectures on the teaching of science, particularly in secondary schools.

Cleanliness Institute: "Outline for Cleanliness Teaching," Cleanliness Institute, 45 E. 17th St., New York City. Section 1, kindergarten, grades 1, 2, 3; Section 2, grades 4, 5, 6; Section 3, grades 7, 8, 9. Free to school administrators, single section free to teachers according to grade taught. Exceptionally valuable. Inquire about other materials.

Coleman, Laurence Vail: "Manual for Small Museums," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1927, 395 pp., $5.00, A. Good handbook.

Comstock, Anna Botsford: "Handbook of Nature Study," Comstock Publishing Co., Ithaca, New York. 1929, 938 pp., $4.00, A. Classic manual for teachers.

Coulter, John M.; Coulter, J. G.; and Patterson, Alice J.: "Practical Nature Study and Elementary Agriculture," D. Appleton and Co., 35 W. 32nd St., New York City. 1909, 354 pp., $1.60, A. Valuable handbook.

Craig, Gerald S.: "Certain Techniques used in Developing a Course of Study in Science for the Horace Mann Elementary School," Bureau of Publications, Teachers College, Columbia University, New York City. 1927, 73 pp., $1.50, A.

Craig, Gerald S.: "Tentative Course of Study in Elementary Science," Bureau of Publications, Teachers College, Columbia University, New York City. 1927, three separate bulletins; Grades 1 and 2, 91 pp.; grades 3 and 4, 126 pp.; grades 5 and 6, 121 pp.; each $.90. Suggested units of instruction, each accompanied by a background of information in science.

Crandall, Ernest L.: "Visual Instruction in Nature Study," The Coca-Cola Company, Atlanta, Ga. 1928, 55 pp., A. A handbook of methods and materials. Communicate with the Coca-Cola bottler in your city concerning the use and distribution of booklets and of eight series of Nature Study cards, 12 cards per series, useful in grades 4, 5 and 6.

Curtis, Francis D.: "Investigations in the Teaching of Science," P. Blakiston's Son and Co., 1012 Walnut St., Philadelphia. 1926, 341 pp., $2.50, A. Digest of investigations in elementary and secondary science for the twenty years preceding publication.

Curtis, Francis D.: "A Synthesis and Evaluation of Subject-Matter Topics in General Science." Ginn and Co., 15 Ashburton Place, Boston. 1929, 83 pp., $1.00, A. A contribution to the selection of the subject matter of general science.

Denslow, Cornelius: "Nature Collections," Boy Scouts of America, 2 Park Ave., New York City. Merit badge series, 1929, 48 pp., $.20, J and A. Very useful suggestions for making and keeping nature collections.

Department of Superintendence of the National Education Association: "Fourth Yearbook," National Education Association, 1201 16th St., N. W., Washington, D. C. 1929, 559 pp., A. Reprinted together with a reprint of the Research Bulletin, "Keeping Pace with the Advancing Curriculum." Excellent summary of aims, method and organization.

Dorris, Anna Verona: "Visual Instruction in the Public Schools," Ginn and Co., 15 Ashburton Place, Boston. 1928, 481 pp., $2.64, A. General guide.

Downing, Elliot R.: "Our Living World," Longmans, Green and Co., 55 Fifth Ave., New York City. 1928, 494 pp., $2.00, HS and A. Well-written accurate sourcebook of materials and method in biological nature study.

Downing, Elliot R.: "Field and Laboratory Guide in Biological Nature-Study," Longmans, Green and Co., 55 Fifth Ave., New York City. 1924, 120 pp., $1.50, A. For use of teachers.

Downing, Elliot R.: "Teaching Science in the Schools," University of Chicago Press, Chicago. 1926, 185 pp., $2.00, A. Summary of results of studies of science-teaching.

Edwards, Charles Lincoln: "Nature Study," part 1 (and other units), Hesperian Press, 2476 Glendower Place, Los Angeles, Calif. 1924, 213 pp., $1.50, A. Type material for elementary grades.

Field, Walter Taylor: "A Guide to Literature for Children," Ginn and Co., 15 Ashburton Place, Boston. 1928, 287 pp., $1.72, A. A valuable guide to choice of literature.

Frank, J. O.: "How to Teach General Science," P. Blakiston's Son and Co., 1012 Walnut St., Philadelphia. 1926, 240 pp., $2.00, A. Most exhaustive treatment of Junior High School methods in science.

Havemeyer, Loomis, and others: "Conservation of our Natural Resources," The Macmillan Co., 60 Fifth Ave., New York City. 551 pp., $4.00, A. New edition based on Van Hise's "The Conservation of Natural Resources in the United States."

Hewitt, C. Gordon: "The Conservation of the Wild Life of Canada," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1921, 343 pp., $2.50, A. A book of interest to sportsmen and lovers of wild life.

Hillegas, Milo B. and others: "The Classroom Teacher," The Classroom Teacher, Inc., 104 S. Michigan Ave., Chicago. 1927-29, $5.00 each, A. Vol. V, primary science and field and laboratory work in nature study; Vol. X, the Junior High School.

Hodge, C. F.: "Nature Study and Life," Ginn and Co., 15 Ashburton Place, Boston. 1902, 514 pp., $1.88, A. Classic reference text for teachers.

Holtz, Frederick: "Nature Study, a Manual for Teachers and Students," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1909, 546 pp., $2.00, A. Handbook for teachers' use.

Jackman, Wilbur S.: "Nature Study," the Third Yearbook Part II, Public School Publishing Co., Bloomington, Ill. 1904, 103 pp., $.85, A. Bulletin of the National Society for the Study of Education, and a contribution worthy of Jackman.

Kephart, Horace: "Camping and Woodcraft," The Macmillan Co., 60 Fifth Ave., New York City. 1924, 479 pp., $2.50, A. Probably the best sourcebook on these subjects.

Lutz, Frank: "Nature Trails," Department of Education, American Museum of Natural History, 77th St. and Central Park West, New York City. 1926, 36 pp., A. Helpful to those interested in nature trails.

Mason, Bernard S.: "Camping and Education: Camp Problems from the Campers' Viewpoint," The Redbook Magazine, The McCall Co., 230 Park Ave., New York City. 1930, 283 pp., $3.00, A. A serious well-organized analysis of the educational values of camping.

Millikan, R. A.: "Science and Life," The Pilgrim Press, 14 Beacon St., Boston. 1924, 90 pp., $1.00, A. Millikan's philosophy.

Mitchell, Dora Otis: "A History of Nature Study," Slingerland-Comstock Co., Ithaca, New York. 1923, 45 pp., $.25, A. Good summary up to 1920.

Monahan, A. C.: "Laboratory Layouts for the High-School Sciences," United States Government Printing Office, Washington, D. C. 1928, 31 pp., $.15, A. A very helpful bulletin.

Needham, James G.: "Outdoor Studies," American Book Co., 88 Lexington Ave., New York City. Reissued, 1926, 90 pp., $.52, J and A. Excellent suggestions for field studies.

Palmer, E. L.: "Camp Fire Nature Guide," Slingerland-Comstock Co., Ithaca, New York. 1926, 23 pp., $.25, J and A. Suggestions for presentation of nature material.

Patterson, Alice Jean: "The Study of Nature," Public School Publishing Co., Bloomington, Ill. 1923, 238 pp., plus 14 pages, $.90, J-1 to 6. A graded study of nature.

Ready, Marie R.: "The Camp in Higher Education," Pamphlet No. 1, Department of the Interior, Superintendent of Documents, Washington, D. C. 1930, 31 pp., $.10, A. Survey.

Ross, Roland Case: "Primary Nature Study, 1925, $1.75, J-1, 2. "School Nature Study," 1925, 40 pp., $2.00, J-3 to 8, Roland Case Ross, 338 Dearborn St., Pasadena, Calif. Well-written weekly outlines for grades 1 to 3, and grades 3 to 8.

Schmucker, Samuel Christian: "The Study of Nature," J. B. Lippincott Co., Washington Square, Philadelphia. Third edition, 1928, 349 pp., $1.40, A. Readable treatment of method, material and philosophy of nature study.

Scott, Charles B.: "Nature Study and the Child," D. C. Heath and Co., 285 Columbus Ave., Boston. 1900, 644 pp., $2.60, J-1 to 8. Aims, methods and detailed outlines.

Soddy, Frederick: "Science and Life," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1920, 229 pp., $4.00, A. Interesting discussion of the relation of science to education.

Terman, Lewis M., and Lima, Margaret: "Children's Reading," D. Appleton and Co., 35 W. 32nd St., New York City. 1925, 363 pp., $1.60, A. Valuable general discussion and annotated book lists.

Twiss, George Ransom: "Principles of Science Teaching," The Macmillan Co., 60 Fifth Ave., New York City. 1917, 486 pp., $2.00, A. Standard advanced text.

Vinal, William Gould: "Nature Guiding," Slingerland-Comstock Co., Ithaca, New York. 1926, 551 pp., $3.50, A. Valuable for both outdoor and schoolroom methods.

Weir, L. H., editor: "Camping Out," The Macmillan Co., 60 Fifth Ave., New York City. 1924, 636 pp., $2.00, A. A complete handbook of the technique of camp operation.

Woodring, M. N.; Oakes, M. E.; and Brown, H. E.: "Enriched Teaching of Science in the High School," Bureau of Publications, Teachers College, Columbia University, New York City. 1928, 374 pp., $2.75, A. A much needed and most useful book. A sourcebook for teachers of general science, biology, physics, chemistry and other sciences, listing chiefly free and low cost illustrative and supplementary materials.

GENERAL INFORMATION

REFERENCES AND TEXTS IN BIOLOGY, NATURE STUDY, PALEONTOLOGY AND GENERAL SCIENCE

——————————: "Nature and Outdoor Life," The University Society, Inc., 468 Fourth Ave., New York City. 5 vols, 2898 pp., $17.50, A. Vol 1, Woodcraft and Camping; Vol. 2, Wild Life; Vol. 3, Flowers and Trees, Natural Sciences; Vol. 4, Gardening, Domestic Animals; Vol. 5, Sports and Games, Pets and Hobbies. Well-illustrated, big set.

Abbott, C. G.: "Everyday Mysteries: Secrets of Science in the Home." The Macmillan Co., 60 Fifth Ave., New York City. 1923, 198 pp., $2.00, J and A. Armchair general science.

Arnold, Augusta F.: "Sea-Beach at Ebb Tide," The Century Press, 353 Fourth Ave., New York City. 1901, 490 pp., $5.00, A. Classic reference for plant and animal life.

Atwood, W. H., and Heiss, E. D.: "Educational Biology," P. Blakiston's Son and Co., Inc., 1012 Walnut St., Philadelphia. 1928, 469 pp., $2.75, A. Text for normal schools and teachers' colleges.

Baitsell, George, editor: "The Evolution of Earth and Man," Yale University Press, New Haven, Conn. 1929, 487 pp., $5.00, A. Interesting lectures for adults.

Beard, D. C.: "The American Boys Handy Book," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1899, 431 pp., $3.00, J-6 to 8. A boys' handbook of demonstrated merit for sports, games and amusements.

Beard, D. C.: "American Boys' Handy Book of Camp-lore and Woodcraft," J. B. Lippincott Co., Washington Sq., Philadelphia. 1920, 270 pp., $3.00, J. 377 illustrations.

Berry, Edward W.: "Paleontology," McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City. 1929, 392 pp., $3.50, A. Authoritative, timely treatment.

Boy Scouts of America: "Conservation," Boy Scouts of America, 2 Park Ave., New York City. Merit badge series, 1929, 49 pp., $.20, J and A. Brief survey of the subject.

Boy Scouts of America: "Official Handbook for Boys," Boy Scouts of America, 2 Park Ave., New York. 1927, 638 pp., $.50, A and J. Handbook of valuable information.

Bradley, John Hogdon: "Parade of the Living," Coward, McCann, Inc., 425 Fourth Ave., New York City. 1930, 308 pp., $3.00, A. An excellent story of the history of the earth and its life.

Caldwell, O. W., and Curtis, F. D.: "Introduction to Science," Ginn and Co., 15 Ashburton Pl., Boston. 1929, 658 pp., $1.68, HS. General science text.

Caldwell, O. W., and Meier, W. H. D.: "Open Doors to Science," Ginn and Co., 15 Ashburton Pl., Boston. 1925, 333 pp., $1.00, J-7, 8, 9. Elementary school science.

Cameron, Jenks: "The Bureau of Biological Survey, Its History, Activities and Organization," The Brookings Institution, 20 Jackson Pl., Washington, D. C. 1929, 139 pp., $2.00, A. Service Monographs of the United States Government, No. 54.

Cavileer, John W.: "Model Boat Building for Boys," Bruce Publishing Co., 354-364 Milwaukee St., Milwaukee, Wis., 1926, 72 pp., $1.65, J-6 to 7. An intriguing book.

Clarke, Beverly L.: "The Romance of Reality," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 225 pp., $2.25, A. The romantic background of science for laymen.

Conklin, E. G.: "Heredity and Environment," Princeton University Press, Princeton, N. J. Sixth edition, 1929, 379 pp., $2.50, A. A series of lectures, first published in 1913, on development, heredity and environment with chapters on eugenics and genetics.

Decker, George C.: "Bows and Arrows for Boys," Bruce Publishing Co., 354-364 Milwaukee St., Milwaukee. 1930, 48 pp., $.75, J-7 to 8. Detailed suggestions for construction and use.

Dendy, A.: "Biological Foundations of Society," D. Appleton and Co., 35 W. 32nd St., New York City, 1924, 227 pp., $2.50, A.

Eikenberry, W. L., and Waldron, R. A.: "Educational Biology," Ginn and Co., 15 Ashburton Pl., Boston. 1930, 549 pp., $2.48, A. A well prepared text for teacher training.

Fabre, Henri: "Here and There in Popular Science," The Century Co., 353 Fourth Ave., New York City. 1926, 350 pp., $2.50, J-7, 8. Reissue of a literary artist's story of science.

Fasten, Nathan: "Origin Through Evolution," Alfred A. Knopf, 730 Fifth Ave., New York City, 1929, 456 pp., $3.25, A. Clear presentation of modern views on evolution.

Flatteley, F. W., and Walton, C. L.: "The Biology of the Sea-shore," The Macmillan Co., 60 Fifth Ave., New York City. 1922, 336 pp., $5.00, A.

Funkhouser, W. D., and Webb, W. S.: "Ancient Life in Kentucky," Kentucky Geological Survey, Frankfort, Ky., 1928, 349 pp., A. Useful book for those interested in Indian records.

Goldring, Winifred: "Handbook of Paleontology for Beginners and Amateurs, with Special Reference to New York State," New York State Museum, Albany, New York. 1929, 356 pp., $1.50, A. A valuable guide for laymen.

Green, George Rex: "A Survey of Nature," Slingerland-Comstock Co., Ithaca, N. Y. 1927, 136 pp., $3.00, A. A collection of lectures on biological and physical nature.

Gruenberg, Benjamin C.: "Biology and Human Life," Ginn and Co., 15 Ashburton Pl., Boston. 1925, 592 pp., $1.72, HS and A. A good high school text.

Gruenberg, Benjamin C.: "The Story of Evolution," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1929, 473 pp., $4.00, A. Non-technical, authentic explanation of the subject and its influence on modern thinking.

Hargitt, C. W. and G. T.: "Outlines of General Biology," Lea and Febiger, S. Washington Sq., Philadelphia. Fifth edition, 1925. 192 pp., $2.00, A. An introductory laboratory manuel revised.

Hillegas, Milo B., and others: "The Classroom Teacher," Vol. IX., The Classroom Teacher, Inc., 104 S. Michigan Ave., Chicago, Ill., 1927-29, $5.00, A. Field work in science and the identification-appreciation section.

Holden, E. S.: "Real Things in Nature," The Macmillan Co., 60 Fifth Ave.. New York City. 1903, 443 pp., $1.20, J-6, 7. Encyclopedic treatment of both the physical and biological fields.

Hunter, George W., and Whitman, W. G.: "Civic Science in Home and Community," American Book Co., 88 Lexington Ave., New York City. 1923, 527 pp., $1.60, J-7. General science text.

Hunter, George W.: "New Essentials of Biology," American Book Co., 88 Lexington Ave., New York City. 1928, 463 pp., $1.68, A. High school text.

Jessup, Elon: "Camp Grub," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1924, 274 pp., $3.50, A. A chatty discussion.

Kinsey, A. C.: "Introduction to Biology." J. B. Lippincott Co., Washington Sq., Philadelphia. 1926, 558 pp., $1.68, HS. An intriguingly unique and satisfactory high school text.

Kinsey, A. C.: "Field and Laboratory Manual in Biology," J. B. Lippincott Co., E. Washington Sq., Philadelphia. 1927, 151 pp., HS. To be used with Kinsey's "Introduction to Biology."

Koppanyi, Theodore: "The Conquest of Life," D. Appleton and Co., 35 W. 32nd St., New York City. 1930, 263 pp., $2.00, A. Valuable popular treatment of biology, emphasizing experimental medicine.

Lull, R. Swann: "The Ways of Life," Harper and Brothers, 49 E. 33rd St., New York City. 1925, 365 pp., $3.00, A. Brief outline of the history of living things as evidence for evolution.

Mason, Francis, editor: "Creation by Evolution," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 392 pp., $5.00, A. A non-technical consensus of present-day knowledge as set forth by leading authorities in various fields of science.

McCabe, Joseph: "The A B C of Evolution," G. P. Putnam's Sons, 2 W. 45th St., New York City, 1929, 124 pp., $1.50, A. A classically simple treatment of a profound subject.

Merriam, John C.: "The Living Past," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1930, 144 pp., $2.00, HS and A. Accounts of ancient life written in simple language, but with deep and sure geologic knowledge.

Merrill, George P.: "Contributions to a History of American State Geological and Natural History Surveys," Government Printing Office, Washington, D. C. 1920, 549 pp., A.

Needham, James G., and Lloyd, J. T.: "Life of Inland Waters," Charles C. Thomas, Springfield, Ill. 1930, 438 pp., $3.50, A. A delightful scientific presentation of interesting information.

Needham, James G., and Needham, Paul R.: "A Guide to the Study of Fresh-Water Biology," Charles C. Thomas, Springfield, Ill. 1930, 90 pp., $1.00, A. A concise and unusually useful guide.

Nichols, M. Louise: "Science for Boys and Girls," J. B. Lippincott Co., Washington Sq., Philadelphia. 1924, 328 pp., $1.20, J-7, 8. School general science.

NORTHROP, ALICE RICH: "Through Field and Woodland," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1925, 532 pp., $5.00, A. An outstandingly useful book for teacher-naturalists and others, splendidly illustrated.

PALMER, E. L.: "Fieldbook of Nature Study," Slingerland-Comstock Co., Ithaca, N. Y. 1930, paper, $2.50, imitation leather, $3.25, A. A field encyclopedia and handbook of biological and physical nature study.

PARSONS, LEONARD M.: "Everyday Science," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 695 pp., $2.75, A. General science text.

PARSONS, T. R.: "The Materials of Life," W. W. Norton and Co., Inc., 70 Fifth Ave., New York City. 1930, 288 pp., $3.00, A. A non-technical discussion of the materials of which living things are made.

PEARSE, A. S.: "Environment and Life," Charles C. Thomas, Springfield, Ill. 1930, 93 pp., $2.50, A.

PICKWELL, GAYLE, and HAZELTINE, KARL: "Western Nature Study," Department of Natural Science, San Jose State College, San Jose, Calif. Quarterly, $.25 per copy, A. Each number is planned to treat a single subject as fully as possible.

ROYSTON, H. P.: "The Unity of Life," World Book Co., Yonkers-on-Hudson, New York. 1926, 281 pp., $2.00, A. A book of nature study for parents and teachers:

SALOMON, JULIAN HARRIS: "The Book of Indian Crafts and Indian Lore," Harper and Brothers, 49 E. 33rd St., New York City. 1928, 418 pp. $3.50, J. Best popular book on the subject.

SCHMIDT, CHARLES C.: "Nature Study and Agriculture," D. C. Heath and Co., 285 Columbus Ave., Boston. 1920, 459 pp., $1.60, A and J. For teachers' use.

SCHWARTZ, G. M.: "Guidebook to Minnesota Trunk Highway No. 1," Librarian, University of Minnesota, Minneapolis, Minn. 1925, 128 pp., A. Bulletin of the Minnesota Geological Survey, describing geologic features, plant life, fish and game of the region.

SETON, ERNEST THOMPSON: "The Library of Pioneering and Woodcraft," Doubleday, Doran and Co., Garden City, N. Y. 1928, 6 vols. $11.00, A or J. Vol. 1, Hiking and Canoeing (Rolf in the Woods); Vol. 2, Animals and Birds (Wild Animal Ways); Vol. 3, Indiancraft (Two Little Savages); Vol. 4, Woodcraft (Book of Woodcraft); Vol. 5, Earth and Sky (Woodland Tales); Vol. 6, Wild Animals (Wild Animals at Home.)

SHELFORD, VICTOR E., EDITOR: "Naturalist's Guide to the Americas," Williams and Wilkins Co., Baltimore, Md. 1926, 761 pp., $8.00, A. A valuable guide for the traveling naturalist.

SHIMER, HERVEY WOODBURN: "An Introduction to the Study of Fossils (Plants and Animals)," The Macmillan Co., 60 Fifth Ave., New York City. 1914, 450 pp., $3.10, A. A college text.

SKINNNER, M. P.: "The Yellowstone Nature Book," A. C. McClurg and Co., 333 E. Ontario St., Chicago. 1924, 224 pp., $2.50, A. A guide to Yellowstone Park.

SMALLWOOD, W. M.; REVELEY, IDA L., and BAILEY, GUY A.: "New General Biology," Allyn and Bacon, 50 Beacon St., Boston. 1929, 801 pp., $1.80, HS. Superior text.

SMITH, EDITH LILLIAN: "Everyday Science Projects," Houghton, Mifflin and Co., 2 Park St., Boston. 1925, 341 pp., $.96, J-6 to 8. Attractively organized units for school study.

Stebbins, C. A.: "Junior Science," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 352 pp., $1.40, J. Formal elementary science.

Thomson, J. Arthur: "Modern Science, a General Introduction." G. P. Putnam's Sons, 2 W. 45th St., New York City. 1930, 370 pp., $3.50. A. Non-technical, and for the but slightly informed reader.

Thomson, J. Arthur, editor: "Outline of Science," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1922, 4 vol., $4.50 each, A. Simple, delightfully readable survey of scientific thought and discovery.

Thomson, J. Arthur: "The Wonder of Life," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1914, 658 pp., $5.00, A. Delightfully written information about the ways of animated life.

Tuttle, Edward M., editor: "Rural Life Reference Library," formerly, "The Book of Rural Life," Bellows-Reeve Co., 4750 Sheridan Rd., Chicago. 1930, 10 vols., 6210 pp., $69.50, A. 8500 topics, alphabetically arranged, 6000 text illustrations and 100 plates in color

Ullrich, Fred T.: "Our Farm World," Longmans, Green and Co., 55 Fifth Ave., New York City. 1929, 581 pp., $3.00, A. The story of agriculture.

Wakeling, Arthur: "Fix it Yourself," Popular Science Publishing Co., Inc., 381 Fourth Ave., New York City. 1929, 256 pp., $2.50, A. Exceptionally useful general science and household book.

Ward, Henshaw: "Evolution for John Doe," Bobbs-Merrill Co., 18 University Sq., Indianapolis, Ind. 1925, 354 pp., $3.50, A. A popular discussion.

Ward, Henry Baldwin, and Whipple, George Chandler: "Fresh-water Biology," John Wiley and Sons, Inc., 440 Fourth Ave., New York City. 1918, 1111 pp., $7.00, A. A classic reference.

Washburne, Carleton: "Common Science," World Book Co., Yonkers-on-Hudson, New York. 1920, 390 pp., $1.56, J-7 to 9. Good elementary physics with unusually interesting approaches.

Webb, Hanor A., and Didcoct, John J.: " Early Steps in Science," D. Appleton and Co., 35 W. 32nd St.. New York City. 1924, 691 pp., $1.68, J-7, 8. Covers a wide range of topics, and suggests many easily performed experiments.

Weldon, G. P.: "Economic Biology; a Text for Students of Agriculture and General Biology," McGraw-Hill Book Co., Inc., 370 7th Ave., New York City. 1929, 457 pp., $2.50, A. A splendid nature-study-agriculture.

Wheat, Frank M., and Fritzpatrick, Elizabeth T.: "Advanced Biology," American Book Co., 88 Lexington Ave., New York City. 1929, 567 pp., $1.80, A. A modern senior high school biology.

Elementary Science or Nature Study

Aitchison, Allison, and Uttley, Marguerite: "Across Seven Seas," Bobbs-Merrill Co., 18 University Sq., Indianapolis, Ind. 1925, 304 pp., $1.50, J-3 or 4. Interesting material for supplementary work.

Albright, Nora, and Hall, Jennie: " Nature Stories for Children," Mentzer, Bush and Co., 2210 South Park Ave., Chicago, Ill. Book 1, 1927, 96 pp., $.72, J-1. Book 2, 1927, 96 pp., $.72, J-1. Short units, based on classroom lessons in many subjects. See also Gordon and Hall, and Holtz and Hall.

Conway, Walter L.; Kauffman, Harry N.: and Lancelot, William H.: "Nature in Agriculture," Webb Book Publishing Co., St. Paul, Minn. 1928, 256 pp., $1.20, J-6, 7. Elementary school agriculture.

DORLAND, GEORGE W.: "In the Open Air," McIndoo Publishing Co., Kansas City, Mo. 1924, 281 pp., $1.20, J-6. Nature study, chiefly biological, by seasons.

FABRE, HENRI: "Story Book of Science," The Century Co., 353 Fourth Ave., New York City. 1917, 400 pp., $2.50, J-7, 8. Delightful story of the wonders of the earth and its creatures.

FAIRBANKS, H. W.: "Conservation Reader," World Book Co., Yonkers-on-Hudson, New York. 1920, 216 pp., $1.20, J-5 and up.

GORDON, EVA L., and HALL, JENNIE: "Nature Stories for Children," Mentzer Bush and Co., 2210 S. Park Ave., Chicago. "Spring," 1927, 88 pp., $.72, J-2; "Autumn," 1926, 90 pp., $.72, J-2. Based on actual field and classroom experiences. See also Albright and Hall, and Holtz and Hall.

GOULD, A. W.: "Mother Nature's Children," Ginn and Co., 15 Ashburton Pl., Boston. New edition, 1928, 261 pp., $.88, J-3 to 6. First edition, 1901. Unlike newer books in style and mechanical makeup, but interesting in content.

HALLOCK, GRACE T.: "A Tale of Soap and Water," Cleanliness Institute, 45 E. 17th St., New York City. 1928, 96 pp., J-6, 7, 8, 9. Limited free distribution in United States to above grades. $.15 per single copy, reduced prices for larger quantities. Historical treatment.

HALLOCK, GRACE T.: "After the Rain," Cleanliness Institute, 45 E. 17th St., New York City. 1927, 112 pp., J-3, 4, 5. Limited free distribution in United States, to above grades. $.40 per single copy, reduced prices for larger quantities. Methods of keeping clean in various countries.

HOLTZ, GRACE, and HALL, JENNIE: "Elementary Science," Mentzer, Bush and Co., 2210 S. Park Ave., Chicago. Book 3 of series, 1930, 160 pp., $.80, J-3. Stories of the ways in which living things make use of the world about them. See also Albright and Hall, and Gordon and Hall.

LANGE, DIETRICH: "Nature Trails," D. Appleton and Co., 35 W. 32nd St., New York City. 1927, 261 pp., $1.20, J-6 and up. Short, interesting sketches about many living things.

LARNED, W. T., EDITOR: "American Indian Fairy Tales," P. F. Volland Co., Joliet, Ill. 1921, 96 pp., $1.25, J-A. An attractive collection of stories, beautifully illustrated in color.

McFEE, INEZ N.: "Little Tales of Common Things," Thomas Y. Crowell Co., 393 Fourth Ave., New York City, 1918, 304 pp., $1.75, J-5.

McGOWAN, ELLEN BEERS: "Soap Bubbles," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 248 pp., $.80, J-4, 5, 6. A great deal of worth-while material about soap and soap-making.

McKAY, HERBERT: "Easy Experiments in Elementary Science," Oxford University Press, 114 Fifth Ave., New York City. 1925, 144 pp., $.50, J. A most practical little book for use with young children.

McKAY, HERBERT: "First Steps in Science," Oxford University Press, 114 Fifth Ave., New York City. Six vols. 1929, 64 pp., each; $.40 each, J. Book 1, "Rain in the Garden;" Book 2, "Sound and Noise;" Book 3, "Candles and Lamps;" Book 4, "The Air and the Wind;" Book 5, "Looking Glasses;" Book 6, "The Sun and the Moon." Simple experiments and observations that could be carried on anywhere. Excellent physical science.

MILLS, ENOS A.: "The Story of a Thousand-Year Pine, and Other Tales of Wild Life," Houghton, Mifflin and Co., 2 Park St., Boston. 119 pp., cloth, $.44, J-8. Selected tales of the author's experiences.

MOSELEY, EDWIN LINCOLN: "Trees, Stars and Birds," World Book Co., Yonkers-on-Hudson, New York. 1925, 404 pp., $1.80, J-6 to 9. Seasonal studies.

Palmer, Katherine V.: "Honne, the Spirit of the Chehalis," Katherine V. Palmer, Ithaca, N. Y. 1925, 204 pp., $1.60, A or J. Nature legends of the Chehalis tribe of West Coast Indians.

Patch, Edith M.: "First Lessons in Nature Study," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 287 pp., $1.12, J-3. Varied material, charmingly written.

Patch, Edith M.: "Holiday Meadow," 1930, 165 pp., $2.00, J-3 to 7. "Holiday Pond," 1929, 147 pp., $2.00, J-3 to 7. The Macmillan Co., 60 Fifth Ave., New York City. Delightful nature stories, scientifically correct.

Patterson, Alice Jean: "Nature Study and Health Education," McKnight and McKnight, Bloomington, Ill. Gr. 1 and 2 (teachers' text), 1928, 164 pp., $.96; Gr. 3, 1928, 184 pp., $.80; Gr. 4, 1927, 131 pp., $.80; Gr. 5, 1926, 192 pp., $.92; Gr. 6, 1927, 224 pp., $.96; Gr. 3, workbook, 1928, 96 pp., $.48; Gr. 4, workbook, 1927, 80 pp., $.40; Gr. 5, workbook 1926, 78 pp., $.40; Gr. 6, workbook. 1927, 96 pp., $.48; Gr. 7-8, text (Science for the Junior High School), 1929, 360 pp., $1.60. Sane, well-planned course.

Persing, Ellis C., and Peeples, E. K.: "Elementary Science by Grades," D. Appleton and Co., 35 W. 32nd St., New York City. Book 2, 1928, 244 pp., $.72, J-2; Book 3, 1928, 264 pp., $.80; J-3. Usable supplementary readers.

Persing, Ellis C., and Wildman, Edward E.: "Elementary Science by Grades," D. Appleton and Co., 35 W. 32nd St., New York City. Book 4, 1929, 292 pp., $.92, J-4. Usable supplementary reader.

Shirling, Arthur E.: "Outdoor Adventures," World Book Co., Yonkers-on-Hudson, New York. 1928, 250 pp., $1.00, J-3, 4, 5. Well-written and accurate supplementary reader.

Skilling, W. T.: "Nature-Study Agriculture," World Book Co., Yonkers-on-Hudson, New York. Revised 1929, 344 pp., $1.48, J-6 to 8. Elementary text.

Slingerland-Comstock Co.: "Camp and Field Notebook," Slingerland-Comstock Co., Ithaca, N. Y. Loose-leaf, 600 forms. 1927, $6.00, A and J. Superior outline drawings.

Speed, James: "Billy and Jane, Explorers," D. C. Heath and Co., 285 Columbus Ave., Boston. Book 1, 1922, 125 pp., $.64, J-2, 3; Book 2, 1924, 164 pp., $.64, J-3, 4. Nature stories based on experiences of two children and several adults.

Tappan, Eva March: "Wonders of Science," Houghton, Mifflin and Co., 2 Park St., Boston. 1927, 257 pp., $.96, J-6 to 8. Popular sceince sketches.

Torelle, Ellen: "Plant and Animal Children: How They Grow," D. C. Heath and Co., 285 Columbus Ave., Boston. 1912, 230 pp., $.96, J-6, 7. Useful book .

Trafton, Gilbert: "Nature Study and Science," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 367 pp., $1.20, J. Good intermediate reader.

Watson, Elizabeth: "The Story of Milk," 1927, 37 pp., $1.25, J. "The Story of Bread," 1927, 48 pp., $1.25, J. Harper and Brothers, 49 E. 33rd St., New York City. Interestingly illustrated historical material.

ANIMAL LIFE

General Manuals and Texts

——: "Nature Lovers' Library," University Society, Inc., 468 Fourth Ave., New York City. 6 vols., 2000 pp., $34.50 or $5.75 per vol., A. Vols. 1-3, "Birds of America." Vol. 4, "Mammals of America," Vol. 5, "Mammals of Other Lands," Vol. 6, "Birds of Other Lands, Reptiles, Fishes, Lower Forms." Good, big library, well-illustrated.

——: "Birds of Other Lands, Reptiles, Fishes, Lower Forms," The University Society, Inc., 468 Fourth Ave., New York City. Vol. 6 of the Nature Lovers' Library, $5.75, A.

Bailey, Vernon: "Animal Life in the Carlsbad Cavern," Williams and Wilkins Co., Baltimore, Md. 1928, 195 pp., $1.00, A. Illustrated guide for any one interested in the natural life of the region, southeastern New Mexico.

Barrows, W. M.: "Science of Animal Life," World Book Co., Yonkers-on-Hudson, New York. 1927, 389 pp., $1.76, HS. Introductory zoology text for one-half year.

Brearley, H. C.: "Animal Secrets Told," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1911, 274 pp., $2.50, A. Interesting studies of adaptations, simply told.

Clark, Austin H.: "Animals of Land and Sea," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1927, 312 pp. $3.00, A. An exceedingly interesting account describing the activities of animals and emphasizing the relations between them and their environment.

Cockerell, T. D. A.: "Zoology," World Book Co., Yonkers-on-Hudson, New York. 1920, 558 pp., $3.60, A. A very comprehensive, well-written college book.

Comstock, Anna Botsford: "The Pet Book," Comstock Publishing Co., Ithaca, N. Y. 1927, 310 pp., $3.50, A or J. Probably the best manual dealing with various animals as pets.

Dixon, Royal: "The Human Side of Animals," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1918, 252 pp., $2.00, A. Popular discussions of habits.

Dixon, Royal, and Eddy, B.: "Personality of Water Animals," Brentano's, 225 Fifth Ave., New York City. 1925, 254 pp., $2.50, J. Popular discussion of habits of many animals.

Duncan, F. Martin: "Cassell's Natural History," Funk and Wagnalls Co., 354-360 Fourth Ave., New York City. 432 pp., $3.50, A, J-6 to 9. A broad survey of the animal kingdom, written in simple non-technical language and very well illustrated.

Elton, Charles: "Animal Ecology," The Macmillan Co., 60 Fifth Ave., New York, City. 1927, 207 pp., $4.00, A. Good general reading for the economic and social side of the subject.

Gamble, F. W.: "The Animal World," Henry Holt and Co., 1 Park Ave., New York City. 1911, 256 pp., $1.25, A. A zoology written from the point of view of function.

Grinnell, Joseph, and Storer, T. I.: "Animal Life in the Yosemite," University of California Press, Berkeley, Calif. 1924, 752 pp., $5.00, A. Best technical book for west coast vertebrate ecology.

Hornaday, W. T.: "American Natural History," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1904, 449 pp., $5.00, HS or A. Good foundation of useful knowledge of the higher animals of North America.

Horsfall, R. Bruce: "Bird and Animal Paintings," Nature Magazine, Washington, D. C. 1928, 58 pp., $1.00, A or J. 168 colored pictures of birds, mammals and insects with notes on their life history. A splendid buy.

Ingersoll, Ernest: "Animal Competitors," The Macmillan Co., 60 Fifth Ave., New York City. 1911, 319 pp., $2.25, A. Studies in natural history made by a careful naturalist.

Jordan, David Starr: "Manual of the Vertebrate Animals," World Book Co., Yonkers-on-Hudson, New York. 1929, 446 pp., $4.00, A. Classic.

Kellogg, Vernon L.: "Elementary Zoology," Henry Holt and Co., 1 Park Ave., New York City. 1922, 484 pp., $1.72, A. Text.

Kellogg, Vernon L.: "Elementary Textbook of Economic Zoology and Entomology," Henry Holt and Co., 1 Park Ave., New York City. 1923, 532 pp., $2.20, A.

Lane, H. H.: "Animal Biology," P. Blakiston's Son and Co., Inc., 1012 Walnut St., Philadelphia. 1929, 588 pp., $3.50, A. A very readable zoology text presenting the animal as a living organism.

Linville, Henry; Kelly, Henry A.; and Van Cleave, Harley J.: "Textbook of General Zoology," Ginn and Co., 15 Ashburton Pl., Boston. 1929, 463 pp., $1.80, A (HS and C). Readable text.

Lubbock, Sir John: "On the Senses, Instincts, and Intelligence of Animals," D. Appleton and Co., 35 W. 32nd St., New York City. 1889, 292 pp., $2.50, A. An excellent discussion (with special reference to insects).

Pratt, Henry S.: "Manual of Land and Fresh-Water Vertebrate Animals of the United States," P. Blakiston's Sons and Co., Inc., 1012 Walnut St., Philadelphia. 1923, 422 pp., $6.00, A. Good manual, illustrated.

Thomson, J. A.: "The New Natural History," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1926, 3 vols., $18.00, A. Good summary, written in a delightful style.

Verrill, A. Hyatt: "Pets for Pleasure and Profit," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1915, 359 pp., $2.00, J-8 to 12.

Whitney, W.; Lucas, F. C.; Shinn, H. B.; and Smallwood, M. E.: "Study of Animals," D. C. Heath and Co., 285 Columbus Ave., Boston. 1911, 197 pp., $1.28, A (HS and C). Text.

Stories of Animal Life

Bass, Florence: "Stories of Animal Life," D. C. Heath and Co., 285 Columbus Ave., Boston. Revised 1912, 172 pp., $.80, J-2. Sketches of the life history and habits of common insects and other animals.

Baynes, Ernest Harold: "Animal Heroes of the Great War," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 307 pp., $2.00, A and J. Reissue of graphic stories of service.

Baynes, Ernest Harold: "Jimmie, a Black Bear Cub," 1924, 134 pp., $1.60, J. "Polaris, the Story of an Esquimo Dog," 1922, 137 pp., $1.50, J. "Sprite, the Story of a Red Fox," 1924, 134 pp., $1.75, J. The Macmillan Co., 60 Fifth Ave., New York City. Interesting accounts of individual animals.

Broadhurst, Jean: "The Animal Way," Cleanliness Institute, 45 E. 17th St., New York City. 1928, 64 pp., J-1, 2, kindergarten. Sold at cost, limited free distribution in United States to above grades. Cleanliness teaching for young children.

Burgess, Thornton W.: "Burgess Animal Book for Children," Little, Brown and Co., 34 Beacon St., Boston. 1920, 363 pp., $3.00, J. Introduction to more scientific works.

Burroughs, John: "Squirrels and other Fur-Bearers," Houghton, Mifflin and Co., 2 Park St., Boston. 1900, 149 pp., $.92, J-7. Delightful sketches of common animals by an artist in story-telling.

Cady, Bertha Chapman: "Tami, the Story of a Chipmunk," Slingerland-Comstock Co., Ithaca, N. Y. 1927, 104 pp., $1.00, J. Charming little story of a pet chipmunk.

CARR, WILLIAM H.: "The Stir of Nature," Oxford University Press, 114 Fifth Ave., New York City. 1930, 192 pp., $2.50, A or J. A book about wild folk friends for young American naturalists.

CLARK, AUSTIN H.: "Nature Narratives," Williams and Wilkins Co., Baltimore, Md., 1929, 135 pp., $1.00, J-4, up. Fifty short accounts of curious and interesting living things.

DUNCAN, F. M., and DUNCAN, L. T.: "Wonders of the Sea," Oxford University Press, 114 Fifth Ave., New York City. 4 vols., 1928-29. 72 to 86 pp., each; $.35 each, J or A. "Dwellers in the Rock Pools," "Life in the Deep Sea," "The Lobster and His Relations," "The Starfish and His Relations." Simple, non-technical treatment of cosmopolitan forms.

DUNCAN, F. M., and DUNCAN, L. T.: "Wonders of Animal Life," Oxford University Press, 114 Fifth Ave., New York City. 5 vols., 1927-29, 90 to 110 pp. each, $.35 each, J or A. "Animal Friends," "Animal Life in Africa," "Animal Life in the New World," "Animal Life in the British Isles," "Animal Life in the East." English publications of simple non-technical material.

DUNN, FANNIE W., and TROXELL, ELEANOR: "Mother Nature Series," Row, Peterson Co., Evanston, Ill. "Baby Animals," 1928, 160 pp., J-2; "By the Roadside," 1928, 256 pp., J-3; "In Field and Forest," 1928, 288 pp., J-4. Stories of animal life.

FINLEY, WILLIAM L., and IRENE: "Wild Animal Pets," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1928, 311 pp., $3.00, J-6 to 12. Valuable accounts concerned with wild pets.

GAYLORD, ILSIEN NATHALIE: "Sea Creatures," Little, Brown and Co., 34 Beacon St., Boston. 1923, 236 pp., $.75, J-4. Very good for children's reference on East coast forms.

HORNADAY, WILLIAM T.: "Tales from Nature's Wonderlands," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1924, 235 pp., $2.50. HS.

HORNADAY, WILLIAM T.: "Wild Animal Round-up," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1925, 372 pp., $5.00, HS, A. Stories and pictures of wild animals of the past and present.

HOYT, DR. VANCE JOSEPH: "Silver Boy," Lothrop, Lee and Shepard Co., 275 Congress St., Boston. 1929, 265 pp., $2.00, J-8. The life story of a California gray fox very well told.

JAEGER, EDMUND C.: "Denizens of the Mountains," Charles C. Thomas, Springfield, Ill. 1930, 168 pp., $2.50, A or J. Authentic life history sketches of some of the more familiar and interesting mammals and birds of the mountains.

JENKINS, OLIVER P.: "Interesting Neighbors," P. Blakiston's Son and Co., Inc., 1012 Walnut St., Philadelphia. 1922, 248 pp., $1.50, J. Stories of common animals told especially for children.

JORDAN, DAVID STARR: "The Story of Matka," World Book Co., Yonkers-on-Hudson, New York. 1924, 78 pp., $.72, J-5 and up. Kipling's "Romance of the White Seal," retold for children.

LANGFORD, GEORGE: "Stories of First American Animals," Horace Liveright, 61 W. 48th St., New York City . 1923, 242 pp., $3.00, J-6. Good for use with children.

LONDON, JACK: "The Call of the Wild," Grosset and Dunlap, 1140 Broadway, New York City, 1903, 211 pp., $1.00, A or J-8. New edition of the kind of a dog story one reads more than once.

Long, William J.: "Secrets of the Woods," 1901, 184 pp., $.72, J-6, 7. "Ways of Wood Folk," 1927, 205 pp., $.72, J-6, 7. "Wilderness Ways," 1928, 154 pp., $.64, J-6, 7. Ginn and Co., 15 Ashburton Pl., Boston. Stories written in entertaining narrative style, possibly overdrawn.

Miller, Olive Thorne: "Little Folks in Feather and Fur," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1908, 357 pp., $3.00, J. Collection of carefully written sketches for young people.

Mills, Enos A.: "The Grizzly," Houghton, Mifflin and Co., 2 Park St., Boston. 1919, 289 pp., $2.50, A. Interesting and instructive sketches based on personal experience with grizzlies.

Mills, Enos A.: "In Beaver World," Houghton, Mifflin and Co., 2 Park St., Boston. 1913, 228 pp., $2.50, A. Good general account.

Mills, Enos A.: "The Story of Scotch," Houghton, Mifflin and Co., 2 Park St., Boston. 1916, 63 pp., $1.25, J and A. A very good dog story.

Muir, John: "Stickeen," Houghton, Mifflin and Co., 2 Park St., Boston. 1909, 74 pp., $1.25, (Riverside Literature Series, $.44), J-8. One of the best dog stories ever written.

Peattie, Donald Culross, and Peattie, Louise Redfield: "Down Wind," D. Appleton and Co., 35 W. 32nd St., New York City. 1929, 231 pp., $2.50, J-8, 9. A book of entertaining animal stories.

Pellett, F. C.: "Our Backdoor Neighbors," The Abingdon Press, 150 Fifth Ave., New York City. 1917, 209 pp., $1.50, J and A. Carefully recorded experiences of the author with familiar small animals, splendidly illustrated with photographs.

Roberts, Charles G. D.: "Haunters of the Silences," 1907, 316 pp., $3.00, A. "House in the Water," 1908, 301 pp., $3.00, A. "The Kindred of the Wild," 1902, 374 pp., $3.00, A. "Watchers of the Trails," 1904, 361 pp., $3.00, A. L. C. Page and Co., 53 Beacon St., Boston. Nature fiction based on animal life and excelling in descriptive detail.

Roberts, Charles G. D.: "Red Fox," L. C. Page and Co., 53 Beacon St., Boston. 1905, 304 pp., $3.00, A. A fox story well worth reading.

Salten, Felix: "Bambi," Simon and Schuster, Inc., 37 W. 57th St., New York City. 1928, 293 pp., $2.50, J and A. Attractive story of deer, translated from the German by Whittaker Chambers.

Schwartz, Julia A.: "Wilderness Babies," Little, Brown and Co., 34 Beacon St., Boston. 1906, 164 pp., $.80, J-4. Interesting and valuable stories of young animals.

Scoville, Samuel, Jr.: "Wild Folk," Little, Brown and Co., 34 Beacon St., Boston. 1922, 184 pp., $2.50, A. A story of the coon, the black bear and the skunk, written as a protest against traps.

Scoville, Samuel: "More Wild Folk," The Century Co., 353 Fourth Ave., New York City. 1924, 184 pp., $2.00, J-6. Companion to "Wild Folk".

Serl, Emma: "In the Animal World," Silver, Burdett and Co., 39 Division St., Newark, N. J. 1913, 232 pp., $.80, J-3. Stories and folk-tales about animals.

Seton, Ernest Thompson: "Bannertail, the Story of a Gray Squirrel," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1922, 265 pp., $2.00, J-6 to 12.

Seton, Ernest Thompson: "Biography of a Grizzly," The Century Co., 353 Fourth Ave., New York City. 1918, 167 pp., $2.00, J-5, 6. Also by Grosset and Dunlap, 1140 Broadway, New York City, at $1.00 plus $.15 postage. A bear story one would reread.

Seton, Ernest Thompson: "The Biography of a Silver Fox," The Century Co., 353 Fourth Ave., New York City. 1909, 209 pp., $2.00, J-5, 6.

Seton, Ernest Thompson: "Animal Heroes," 1905, 364 pp., $2.50, J-6 to 12. "Lives of the Hunted," 1908, 360 pp., $2.50, J-7 to 12. "Wild Animals I Have Known," 1898, 358 pp., $2.50, J-7 to 12. Charles Scribner's Sons, 597 Fifth Ave., New York City. Vivid and dramatic stories founded on the life stories of actual animals. "Lives of the Hunted" and "Wild Animals I Have Known" also published by Grosset and Dunlap, 1140 Broadway, New York City, at $1.00 plus $.15 postage.

Terhune, Albert Payson: "Lad, a Dog," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1926, 371 pp., $2.00, J or A. A well-liked story.

Williams, Edward H.: "Animal Autobiographies," Williams and Wilkins Co., Baltimore, Md. 1930, 140 pp., $1.00, J-4 up. Stories based on scientific facts about Johnny Woodchuck, Pete Jackrabbit, Caw Crow and Flash Flying Squirrel.

Birds

Alexander, W. B.: "Birds of the Ocean," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 428 pp., $3.50, A. Convenient handbook for identification of sea birds likely to be seen on ocean voyages.

Allen, Arthur Augustus: "The Book of Bird Life," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1930, 426 pp., $3.50, A. Readable sourcebook of bird information.

Allen, Arthur Augustus: "Illustrated Key to Birds' Nests," Slingerland-Comstock Co., Ithaca, N. Y. 1927, 28 pp., $.25, A or J. Includes nests of common resident birds of northeastern North America.

Allen, Arthur Augustus; Fuertes, Louis Agassiz; and Pirnie, Miles: "Ornithology Laboratory Notebook for Intensive Study of the Birds of Eastern North America," Slingerland-Comstock Co., Ithaca, N. Y., 1927, $4.00, A. Useful for course in ornithology.

Allen, Glover M.: "Birds and Their Attributes," Marshall Jones Co., 212 Summer St., Boston. 1925, 338 pp., $3.50, A. General survey of the life and structure of birds and their relation to man.

Bailey, Bert Heald: "The Raptorial Birds of Iowa," Bulletin 6, Iowa Geological Survey, Des Moines, Iowa. 1918, 238 pp., A. A report of studies of the value of this group.

Bailey, Florence Merriam: "Birds of New Mexico," New Mexico Department of Game and Fish, Santa Fe, N. M. 1928, 807 pp., $5.00, A. Most comprehensive manual of birds of the southwest with illustrations by Allan Brooks.

Bailey, Florence M.: "Birds of Village and Field," Houghton, Mifflin and Co., 2 Park St., Boston. 1898, 406 pp., $2.00, J. A book designed for beginners in bird study.

Bailey, Florence M.: "Handbook of Birds of Western United States," Houghton, Mifflin and Co., 2 Park St., Boston. 1914, 590 pp., $6.00, A. Standard manual for the west.

Bailey, Harold H.: "Birds of Florida," Harold H. Bailey, 206 Exchange Bldg., Miami, Fla. 1925, 146 pp., $20.00, A. Excellent, but limited in usefulness.

Bailey, Harold H.: "Birds of Virginia," Harold H. Bailey, 206 Exchange Bldg., Miami, Fla., 1913, 362 pp., $7.00, A. 14 colored plates, 108 halftones, map of Virginia.

Ball, Alice E.: "Bird Biographies," Dodd, Mead and Co., 443-449 Fourth Ave., New York City. 1923, 295 pp., $5.00, A and J. An introduction to 150 common land birds of the eastern United States.

Baxter, Leon H.: "Boy Birdhouse Architecture," Bruce Publishing Co., Milwaukee, Wis. 1929, 62 pp., $1.00, J-6 to 7. Clear drawings of plans for houses for various species of birds.

Baynes, Ernest Harold: "Wild Bird Guests," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1915, 326 pp., $2.00, A. Valuable suggestions for attracting birds, delightfully written.

Beard, Daniel Carter: "American Boys' Book of Birds and Brownies of the Woods," J. B. Lippincott Co., Washington Sq., Philadelphia, 1923, 242 pp., $2.50, J. Illustrated.

Bent, Arthur Cleveland: "Life Histories of North American Wild Fowl," Smithsonian Institution, Washington, D. C. 1923-1925, 239 pp., 313 pp., A. Part of a series of bulletins of the United States National Museum, detailed studies of various groups of birds, for use by experienced ornithologists.

Blanchan, Neltje: "Birds," Grosset and Dunlap, 1140 Broadway, New York City. 257 pp., $1.00 plus $.15 postage, A or J. Popular treatment of birds in general.

Blanchan, Neltje: "Bird Neighbors," 1911, 234 pp., $4.00, HS and A. "Birds that Hunt and are Hunted," 1899, 359 pp., $4.00, HS and A. Doubleday, Doran and Co., Garden City, New York. Good introduction to common land and water birds.

Blanchan, Neltje: "Birds Worth Knowing," Doubleday, Doran and Co., Garden City, New York. 1926, 257 pp., $2.50, A or J. Brief, popular introduction to common birds.

Bralliar, Floyd: "Knowing Birds through Stories," Funk and Wagnalls Co., 354-360 Fourth Ave., New York City. 1922, 355 pp., $2.00, J-4 to 8. Stories written in first person about birds of many families.

Brooks, Allan: "Audubon Bird Cards," Set 1, 50 Winter Birds of Eastern North America; Set 2, 50 Spring Birds of Eastern North America; Set 3, 50 Summer Birds of Eastern North America. National Association of Audubon Societies, 1974 Broadway, New York City. Postcard size with text by Alden H. Hadley on back. Each set, $1.00.

Burgess, Thornton W.: "The Book of Birds for Children," Little, Brown and Co., 34 Beacon St., Boston. 1919, 353 pp., $3.00, J. Popular stories for little children.

Burroughs, John: "Wake Robin," Houghton, Mifflin and Co., 2 Park St., Boston. 1899, 233 pp., $2.25, A. Delightful interpretations of bird life.

Califf, Gladstone: "Permanent Bird Houses," Bruce Publishing Co., Milwaukee, Wis. 1924, 64 pp., $1.00, J-7 to 8. Plans and instructions for houses for several species of birds.

Chapman, Frank M.: "Bird Life," D. Appleton and Co., 35 W. 32nd St., New York City. 1928, 284 pp., $5.00, A.

Chapman, Frank M.: "Camps and Cruises of an Ornithologist," D. Appleton and Co., 35 W. 32nd St., New York City. 1908, 431 pp., $4.00, A. Delightful description of experiences connected with the collection of specimens for the American Museum.

CHAPMAN, FRANK M.: "Color Key to North American Birds," D. Appleton and Co., 35 W. 32nd St., New York City. 1912, 356 pp., $3.50, A. Helpful for field identification.

CHAPMAN, FRANK M.: "Handbook of Birds of Eastern North America," D. Appleton and Co., 35 W. 32nd St., New York City. 1923, 530 pp., $4.00, A. Standard manual for study and identification.

CHAPMAN, FRANK M.: "My Tropical Air Castle," D. Appleton and Co., 35 W. 32nd St., New York City, 1929, 417 pp., $5.00, A. Chapman at his best literary style.

CHAPMAN, FRANK M.: "Our Winter Birds," D. Appleton and Co., 35 W. 32nd St., New York City. 1918, 180 pp., $.80, J-5. Full treatment of the group.

CHAPMAN, FRANK M.: "The Travels of Birds," D. Appleton and Co., 35 W. 32nd St., New York City. 1916, 160 pp., $.76, J-4, 5. Simple presentation of bird migration.

CHAPMAN, FRANK M.: "What Bird is That?" D. Appleton and Co., 35 W. 32nd St., New York City. 1920, 144 pp., $1.50, J-5, 6. Excellent pocket guide to land birds of eastern United States, illustrated in color, arranged according to season.

CHAPMAN, FRANK M., and SAWYER, E. J.: "Pocket Bird Collection," (Nos. 1, 2 and 3 for birds east of the Rockies, and No. 4 for birds west of the Rockies), National Association of Audubon Societies, 1974 Broadway, New York City. $.10 each, A and J. A best buy.

COOKE, W. W.: "Bird Migration," Bulletin 185, U. S. D. A., Superintendent of Documents, Government Printing Office, Washington, D. C. 1910, 47 pp., $.10, A. Report of an extensive study of bird migration.

COUES, ELLIOT: "Key to North American Birds," L. C. Page and Co., 53 Beacon St., Boston. Revised 1903, sixth edition, 1927, 1152 pp., 2 vols., $15.00, A. Interesting standard work for technical ornithology.

DIXON, ROYAL: "The Human Side of Birds," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1917, 246 pp., $2.00, A. Popular treatment.

DUNCAN, F. M., and DUNCAN, L. T.: "Birdland," Oxford University Press, 114 Fifth Ave., New York City. Reprinted, 1929, 94 pp., $.35, J. One of the series, "Wonders of Animal Life," consisting of general material on the subject.

DUNCAN, F. M., and DUNCAN, L. T.: "The Sea Birds," Oxford University Press, 114 Fifth Ave., New York City, 1929, 77 pp., $.35, J. One of the series, "The Wonders of the Sea," published in England but considering species found also in America.

EATON, ELON HOWARD: "Birds of New York," Memoir 12, New York State Museum, Albany, New York. 1916, 2 vols., $6.00, color plates separate if desired. A comprehensive treatment combined with a very good set of color plates by L. A. Fuertes.

ECKSTORM, FANNIE HARDY: "The Bird Book," D. C. Heath and Co., 285 Columbus Ave., Boston. 1901, 288 pp., $1.28, J-6 to 8. Simple book on general bird life.

ELIOT, WILLIAM AYRES: "Birds of the Pacific Coast," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1926, 211 pp., $3.50, A. Illustrated field guide.

FINLEY, WILLIAM LOVELL: "American Birds," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1908, 256 pp., $3.00, J-8 to 12. Accurate reports with pen and camera, of habits and actions of representative birds.

Finley, William L. and Irene: "Little Bird Blue," Houghton, Mifflin and Co., 2 Park St., Boston. 1915, 60 pp., $.80, J-4. The true record of two children's experiences with a baby bluebird.

Forbush, Edward Howe: "Birds of Massachusetts and other New England States," State Board of Agriculture, State House, Boston, Vol. 1, third printing, 1929; Vol. 2, second printing, 1929; Vol. 3, 1929, each $5.00, A. Probably the best extensive treatment of birds of the northeastern United States with superior illustrations in color by L. A. Fuertes and Allan Brooks.

Friedmann, Herbert: "The Cowbirds," Charles C. Thomas, Springfield, Ill. 1929, 419 pp., $6.00, A. Interesting and exhaustive study of one group.

Grey, Viscount of Fallodon, K. G.: "The Charm of Birds," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1927, 286 pp., $3.00, A. Charming essays on birds and bird song by an English statesman and bird lover.

Grinnell, Elizabeth and Joseph: "Our Feathered Friends," D. C. Heath and Co., 285 Columbus Ave., Boston. 1898, 156 pp., $.80, J-4 to 8. Delightful.

Grinnell, Joseph; Bryant, Harold C.; and Storer, T. I.: "Game Birds of California," University of California Press, Berkeley, Cal. 1918, 642 pp., $6.00, A. Excellent technical work.

Hartley, G. Inness: "The Importance of Bird Life," The Century Co., 353 Fourth Ave., New York City. 1922, 316 pp., $2.00, J-6. Discussion of the value of both wild and domestic birds.

Hawksworth, Hallam: "A Year in the Wonderland of Birds," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1925, 245 pp., $1.00, J-6 to 8. Birds and bird life, presented seasonally for children.

Henderson, Junius: "The Practical Value of Birds," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 342 pp., $2.50, A. Good general discussion, followed by systematic discussion of the subject.

Henshaw, Henry W.: "The Book of Birds, Common Birds of Town and Country and American Game Birds," National Geographic Society, Washington, D. C. 1927, 215 pp., $3.00, A. Notes and brief descriptions with small illustrations by L. A. Fuertes.

Hoffmann, Ralph A.: "Birds of the Pacific States," Houghton, Mifflin and Co., 2 Park St., Boston. 1927, 353 pp., $5.00, A.

Hoffmann, Ralph A.: "Guide to the Birds of New England and Eastern New York," Houghton, Mifflin and Co., 2 Park St., Boston. 1923, 357 pp., $3.00, A. Manual.

Hornaday, William T.: "Bird Study," Boy Scouts of America, 2 Park Ave., New York City. Merit badge series, 1929, 34 pp., $.20, J and A.

Hudson, W. H.: "Adventures Among Birds," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1920, 316 pp., $3.00, A. Delightful sketches about birds and bird life.

Jaeger, Edmund C.: "Denizens of the Desert," Houghton, Mifflin and Co., 2 Park St., Boston. 1922, 299 pp., $3.00, A. Decidedly readable.

Kalmbach, E. R., and McAtee, W. L.: "Homes for Birds," Farmers' Bulletin 1456, U. S. D. A., United States Department of Agriculture, Washington, D. C. Revised 1926, 22 pp., $.05, A. Helpful suggestions for building and placing bird houses.

Lange, D.: "Our Native Birds," The Macmillan Co., 60 Fifth Ave., New York City. 1915, 162 pp., $1.75, A. A new edition of an old book, emphasizing protecting and attracting birds.

MARTIN, JOHN L.: "A Wayside Inn for Birds," D. C. Heath and Co., 285 Columbus Ave., Boston. 1929, 204 pp., $.88, J-7, 8. Interesting experiences with bird visitors at the writer's feeding station.

MATHEWS, F. SCHUYLER: "The Book of Birds for Young People," G. P. Putnam's Sons, 2 West 45th St., New York City. 1929, 323 pp., $3.00, J. Popular book worth having.

MATHEWS, F. SCHUYLER: "Fieldbook of Wild Birds and their Music," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 332 pp., $3.50, A. Guide for identification.

MILLER, OLIVE THORNE: "The First Book of Birds," 1899, 149 pp., $.92, J-4. "The Second Book of Birds," 1901, 204 pp., $2.00, J. Houghton, Mifflin and Co., 2 Park St., Boston. Talks to children about the life and habits of birds.

MINER, JACK: "Jack Miner and the Birds," Reilly and Lee Co., 536 Lake Shore Drive, Chicago. 1923, 176 pp., $2.50, A. Useful to sanctuary enthusiasts.

MINER, JACK: "Jack Miner on Current Topics," Ryerson Press, Toronto, Ontario, Canada. 1929, 111 pp., $2.50, A. New discussions of bird life and bird sanctuaries.

NATIONAL ASSOCIATION OF AUDUBON SOCIETIES: "Educational Leaflets," National Association of Audubon Societies, 1974 Broadway, New York City. $.05 each.

NUTTALL, THOMAS: "Popular Handbook of the Birds of United States and Canada," Little, Brown and Co., 34 Beacon St., Boston. 1903, part 1, 473 pp., part 2, 431 pp., $5.00, A. Standard reference for land birds, and game and water birds.

PATCH, EDITH M.: "Bird Stories," Little, Brown and Co., 34 Beacon St., Boston. 1927, 212 pp., $1.50, J. Charming stories of twelve birds written for children.

PATTESON, S. LOUISE: "How to have Bird Neighbors," D. C. Heath and Co., 285 Columbus Ave., Boston. 1917, 138 pp., $.92, J-5, 6. Stories of "neighborship" with birds, for children.

PEARSON, T. GILBERT: "The Bird Study Book," Doubleday, Doran and Co., Garden City, New York. 1919, 258 pp., $1.25, J and A. A beginner's book of bird life and habits.

PEARSON, T. GILBERT: "Stories of Bird Life," World Book Co., Yonkers-on-Hudson, New York. 1924, 236 pp., $1.00, J-5 to 7. A book of stories true to bird life, written in simple language.

PEARSON, T. GILBERT, EDITOR: "Birds of America," The University Society, Inc., 468 Fourth Ave., New York City. Vols. 1-3 of the Nature Lovers Library, $17.25, A. See section on General References on animal life.

PELLETT, FRANK C.: "Birds of the Wild—How to make your Home their Home," A. T. De La Mare Co., Inc., 438-448 W. 37th St., New York City. 1928, 128 pp., $1.90 postpaid, A. Well-written.

REED, CHESTER A.: "Bird Guide, Land Birds East of the Rockies," Doubleday, Doran and Co., Garden City, New York. 1925, 238 pp., cloth, $1.25; imitation leather, $1.50, A or J. Convenient pocket guide.

REED, CHESTER A.: "Bird Guide, Water and Game Birds East of the Rockies," Doubleday, Doran and Co., Garden City, New York. 1921, 240 pp., cloth, $1.25; imitation leather, $1.50, A or J. Convenient pocket guide.

REED, CHESTER A.: "Western Birds," Doubleday, Doran and Co., Garden City, New York. 1913, 255 pp. $1.75, A or J. Convenient pocket guide.

Sandys, E., and VanDyke, T. S.: "Upland Game Birds," The Macmillan Co., 60 Fifth Ave., New York City. Reissue, 1924, 429 pp., $1.75, A.

Saunders, Aretas A.: "Bird Song," New York State Museum, Albany, New York. 1929, 202 pp., $.50, A. Detailed popular presentation of the subject.

Sturgis, B. B.: "Field Book of Birds of the Panama Canal Zone," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 466 pp., $3.50, A. Popular handbook, illustrated.

Taverner, P. A.: "Birds of Western Canada," Museum Bulletin No. 41, Bureau of Mines, Ottawa, Canada. 1928, 379 pp., $2.00, cloth, A. Valuable monograph for bird study and identification.

Thomson, A. L.: "Birds: an Introduction to Ornithology," Henry Holt and Co., 1 Park Ave., New York City. 1927, 256 pp., $1.25, A.

Thomson, J. Arthur: "The Biology of Birds," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 436 pp., $5.00, A.

Trafton, Gilbert H.: "Methods of Attracting Birds," Houghton, Mifflin and Co., 2 Park St., Boston. 1910, 167 pp., $2.00, A. Simple definite suggestions.

Walter, H. E., and Walter, A. H.: "Wild Birds in City Parks," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 111 pp., $1.50, A. New edition of a small guide for observation and identification.

Wetmore, Alexander: "The Migrations of Birds," Harvard University Press, Cambridge 38, Mass. 1926, 217 pp., $2.50, A. Probably the most extensive treatment of the subject.

Wheelock, Irene Grosvenor: "Birds of California," A. C. McClurg and Co., 333 E. Ontario St., Chicago. 1920, 578 pp., $4.00, A. Non-technical guide, classifying birds as to habitat or color.

Wright, Mabel Osgood: "Birdcraft," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 317 pp., $2.50. Ninth edition of a manual for identification and study.

Wright, Mabel Osgood: "The Gray Lady and the Birds," The Macmillan Co., 60 Fifth Ave., New York City. 1924, 440 pp., $2.00, J. Reissue of an older book devoted to information about birds and their protection.

Wright, Mabel Osgood, and Coues, E.: "Citizen Bird," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 435 pp., $2.25, A. New edition of a book of stories of bird life.

Wyman, Luther E., and Burnell, Elizabeth: "The Fieldbook of Birds of the Southwestern United States," Houghton, Mifflin and Co., 2 Park St., Boston. 1925, 308 pp., $3.00,A.

Insects and Their Kin (Invertebrates)

Balfour-Browne, Frank: "Insects," Henry Holt and Co., 1 Park Ave., New York City. 1928, 256 pp., $1.25, A.

Bouvier, E. L.: "The Psychic Life of Insects," The Century Co., 353 Fourth Ave., New York City. 1922, 377 pp., $2.00, J-7, 8. Howard's translation recommended.

Bradley, J. C., and Palmer, E. L.: "Insect Life," Boy Scouts of America, 2 Park Ave., New York City. 1925, 240 pp., $1.50, A or J. Interesting for use with young students.

Bralliar, Floyd: "Knowing Insects through Stories," Funk and Wagnalls Co., 354-360 Fourth Ave., New York City. 1921, 323 pp., $1.75, J-4 to 8. Non-technical accounts of life histories of a number of common insects.

Brown, Ethel C.: "The Green Gate to the Sea," Silver, Burdett and Co., 39 Division St., Newark, N. J. 1924, 176 pp., $.76, J-2, 3, 4. Information about sea-shore life presented through the experiences of two children.

Brues, C. T.: "Insects and Human Welfare," Harvard University Press, Cambridge 38, Mass. 1920, 104 pp., $2.50, A. An account of the more important relations of insects to the health of man, to agriculture and to forestry.

Carpenter, George A.: "The Biology of Insects," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 473 pp., $6.50, A. An interesting book, simply but not popularly written.

Cheesman, Evelyn: "Everyday Doings of Insects," Robert M. McBride and Co., 7 W. 16th St., New York City. 1924, 245 pp., $2.50, A. Descriptions of definite insect characteristics, rather than of individual insects.

Comstock, Anna Botsford: "The Common Butterflies, An Outline for Butterfly Study," Slingerland-Comstock Co., Ithaca, N. Y. 1917, 44 pp., $.25, A. Key based on color.

Comstock, Anna Botsford: "The Moth Number," Slingerland-Comstock Co., Ithaca, N. Y. 1919, 53 pp., $.25, A or J. Interesting material about a number of common moths.

Comstock, Anna Botsford: "Ways of the Six-Footed," Slingerland-Comstock Co., Ithaca, N. Y. 1926, 149 pp., $1.00, J or A. Charming, true stories of insect life, for readers of any age.

Comstock, John Henry, and Comstock, Anna B.: "How to Know the Butterflies of the Eastern United States," Comstock Publishing Co., Ithaca, N. Y. 1920, 311 pp., $3.50, A. Well illustrated in color and exceedingly useful for amateurs.

Comstock, John Henry: "An Introduction to Entomology," Comstock Publishing Co., Ithaca, N. Y. 1929, 1044 pp., $6.00, A. A classic manual, interestingly written.

Comstock, John Henry: "Insect Life," D. Appleton and Co., 35 W. 32nd St., New York City. 1924, 349 pp., $4.00, A. A brief, well-written discussion of insects as a group.

Comstock, John Henry: "The Spider Book," Doubleday, Doran and Co., Garden City, N. Y. 1913, 707 pp., A. The standard manual.

Demuth, George S., and Rowe, H. G.: "Starting Right with Bees," A. S. Root Co., Medina, Ohio. New edition, 1928, 128 pp., $1.00, A. Simple, illustrated manual.

Dixon, Royal, and Eddy, Brayton: "The Personality of Insects," Henry Holt and Co., 1 Park Ave., New York City. 1924, 253 pp., $2.50, A. Popular treatment of insect behavior.

Duncan, F. M., and Duncan, L. T.: "Wonders of Insect Life," Oxford University Press, 114 Fifth Ave., New York City. 6 vols. 1927-29, 84 to 88 pp. each, $.35 each, J. "Spiders and Scorpions," "Butterflies and Moths," "Insect Life in Pond and Stream," "Bees, Wasps, and Ants," "Beetles and Flies," "Some Curious Insects." Well illustrated simple material.

Eliot, Ida Mitchell, and Soule, Caroline Gray: "Caterpillars and Their Moths," The Century Co., 353 Fourth Ave., New York City. 1902, 302 pp., $3.00, A. Suggestions for rearing moths and exact statements of the writers' experiences and experiments in life history studies of 43 species.

Essig, E. O.: "Insects of Western North America," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 1035 pp., $10.00, A. Very good systematic work.

Evrard, Eugene: "The Mystery of the Hive," Dodd, Mead and Co., 443-449 Fourth Ave., New York City. 1923, 369 pp., $2.50, A. Very entertaining life story of honey bees.

Ewing, Henry Ellsworth: "A Manual of External Parasites," Charles C. Thomas, Springfield, Ill. 1929, 224 pp., $4.50, A. Technical work on the group.

Fabre, J. Henri: "Insect Adventures," World Book Co., Yonkers-on-Hudson, New York. 1917, 287 pp., $1.28, J-4 to 7. Several delightful sketches edited for children.

Fabre, Jean Henri: "The Life of the Fly," 1913, 477 pp., A. "The Life of the Grasshopper," 1917, 453 pp., A. "The Sacred Beetle and Others," 1918, 425 pp., A. "More Beetles," 1922, 322 pp., A. "The Mason Bees," 1914, 315 pp., A. "Insect Adventures," 1917, 287 pp., A. "Hunting Wasps," 1915, 427 pp., A. "More Hunting Wasps," 1921, 376 pp., A. "Glow-worms and Other Beetles," 1919, 488 pp., A. "The Life of the Weevil," 1922, 346 pp., A. "The Life of the Spider," 1913, 404 pp., A. "Bramble-Bees and Others," 1915, 456 pp., A. "The Life of the Caterpillar," 1916, 376 pp., A. "The Life of the Scorpion," 1923, 344 pp., A. "Book of Insects," 1921, 271 pp., A. Dodd, Mead and Co., 443-449 Fourth Ave., New York City. Each $2.50 except the last, which is published in De Luxe edition, at $5.00 and also at $2.00. Delightful intimate studies of insect life told artistically.

Fabre, J. H. C.: "Social Life in the Insect World," The Century Co., 353 Fourth Ave., New York City. 1912, 327 pp., $4.00, A. Charmingly told studies.

Felt, E. P.: "Manual of Tree and Shrub Insects," The Macmillan Co., 60 Fifth Ave., New York City. 1924, 382 pp., $3.50, A. Excellent popular science book on an important ecological group.

Felt, E. P.: "Popular Guide to the Study of Insects," New York State Museum, Albany, New York. 1929, 147 pp., $.50, A. Detailed suggestions for study and excellent lists of reference books.

Fernald, H. T.: "Applied Entomology," McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City. Second edition. 1926, 395 pp., $3.50, A. A comprehensive systematic work with a well-developed economic aspect.

Forel, A.: "The Social World of the Ants," Albert and Charles Boni, Inc., 66 Fifth Ave., New York City. 1928, vol. 1, 551 pp., vol. 2, 444 pp., $15.00, A. Beautifully illustrated technical work.

Hawksworth, Hallam: "The Clever Little People with Six Legs," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1924, 294 pp., $1.20, J-6 to 8. Lively stories of insect life histories and habits, arranged seasonally.

Headlee, Thomas J.: "The Mosquitoes of New Jersey and their Control," New Jersey Agricultural Experiment Station, New Brunswick, N. J. Bulletin 348, free to citizens of New Jersey, and to professional workers. Technical.

Herrick, Glenn W.: "Insects Injurious to the Household and Annoying to Man," The Macmillan Co., 60 Fifth Ave., New York City. Revised 1926, 478 pp., $3.00, A. Standard work on the group.

Hingston, R. W. G.: "Instinct and Intelligence," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 296 pp., $2.50, A. Intriguing story, inspiring to personal experimentation with insects.

Hodson, Glen Eaton: "Insects," (Mother and Ann Nature Stories), Webb Publishing Co., St. Paul, Minn. 1928, 176 pp., $.72, J-4. Stories containing informational material.

HOLLAND, W. J.: "The Butterfly Guide," Doubleday, Doran and Co., Garden City, New York. 1916, 237 pp., $1.25, A or J. Convenient pocket handbook.

HOLLAND, W. J.: "The Butterfly Book," Doubleday, Doran and Co., Garden City, New York. 1898, 382 pp., $5.00, A. Standard work, invaluable because of the long series of colored illustrations.

IMMS, A. D.: "General Textbook of Entomology," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1925, 698 pp., $10.80, A. One of the best texts.

JOHNSON, MYRTLE ELIZABETH, and SNOOK, HARRY JAMES: "Seashore Animals of the Pacific Coast," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 659 pp., $7.50, A. Best manual in its line, touching chiefly invertebrates.

KELLOGG, VERNON: "Insect Stories," D. Appleton and Co., 35 W. 32nd St., New York City. 1923, 298 pp., $2.00, J-6, 7, 8. Stories presenting life histories.

LUTZ, FRANK E.: "Fieldbook of Insects with Special Reference to Those of Northeastern United States," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 562 pp., $3.50, A. Best fieldbook for popular use.

McDANIEL, E. I.: "Greenhouse Insects," special bulletin 134, Michigan State Agricultural College, East Lansing, Mich. 1924, 75 pp., free, A. Insects of indoor plants and their control.

McFEE, INEZ N.: "Lives of Busy Neighbors," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1924, 301 pp., $2.00, J. Interestingly written life histories of insects and some other invertebrates.

McFEE, INEZ N.: "Nature's Craftsmen," Thomas Y. Crowell Co., 393 Fourth Ave., New York City. 1923, 336 pp., $1.75, J-5. Good narratives.

MAETERLINCK, MAURICE: "Children's Life of the Bee," Dodd, Mead and Co., 443-449 Fourth Ave., New York City. 1919, 192 pp., $2.00, J. A simple arrangement of the author's famous "Life of the Bee."

MAETERLINCK, MAURICE: "The Life of the Bee," 1927, 427 pp., $2.50, A. "The Life of the White Ant," 1927, 233 pp., $2.50, A. Dodd, Mead and Co., 443-449 Fourth Ave., New York City. Life histories that are also literature.

MATHESON, ROBERT: "A Handbook of the Mosquitoes of North America," Charles C. Thomas, Springfield, Ill. 1929, 274 pp., $5.50, A. Technical work.

MIALL, L. C.: "The Natural History of Aquatic Insects," The Macmillan Co., 60 Fifth Ave., New York City. 1895, 395 pp., $1.75, A. A valuable illustrated popular account of both larval and adult insects.

MORGAN, ANN: "Field Book of Ponds and Streams," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1930, 448 pp., $3.50, A. Well-illustrated popular handbook.

MORLEY, MARGARET: "The Bee People," A. C. McClurg and Co., 333 E. Ontario St., Chicago. 1900, 177 pp., $1.50, J-8, 9. A very good children's book.

NEEDHAM, JAMES G.: "Elementary Lessons on Insects," Charles C. Thomas, Springfield, Ill. 1928, 206 pp., $2.00, HS. Simple introduction with a valuable chapter on collection.

NEEDHAM, JAMES G. and HEYWOOD, HORTENSE B.: "A Handbook of the Dragonflies of North America," Charles C. Thomas, Springfield, Ill., 1929, 386 pp., $7.00, A. Technical study.

Needham, James G.; Frost, Stuart W.; and Tothill, Beatrice W.: "Leaf Mining Insects," Williams and Wilkins Co., Baltimore, Md. 1928, 351 pp., $6.00, A. A comprehensive and sympathetic study, with a list of leaf-mining insects, a tabulation of host plants and a bibliography.

O'Kane, Walter C.: "Injurious Insects, How to Recognize and Control Them," The Macmillan Co., 60 Fifth Ave., New York City. 1912, 414 pp., $3.25, A. A general illustrated account of insects in relation to their environment, with short accounts of species grouped by food habits.

Palmer, Katherine V.: "Atlantic-Coast Shells" and "Pacific-Coast Shells," Slingerland-Comstock Co., Ithaca, N. Y. 1926, two small illustrated pamphlets, $.10 each, A.

Patch, Edith M.: "Hexapod Stories," Little Brown and Co., 34 Beacon St., Boston. 1923, 179 pp., $1.50, J-3. Charming stories of common insects.

Patterson, Alice Jean: "The Spinner Family," A. C. McClurg and Co., 333 E. Ontario St., Chicago. 1903, 159 pp., $1.75, J. Popular children's book of spiders, well-illustrated and charmingly written.

Pettit, R. H.: "Common Pests of Field and Garden Crops," special bulletin 183. Michigan State Agricultural College, East Lansing, Mich. 1929, 77 pp., free, A. Popular treatment of the subject.

Phillips, E. F.: "Bee Keeping," The Macmillan Co., 60 Fifth Ave., New York City. Revised edition, 1928, 490 pp., $4.00, A. Comprehensive volume by a recognized authority.

Phillips, Mary Geisler. "Ant Hills and Soap Bubbles," 1929, 265 pp., $.92, J-5, 6. "Honey Bees and Fairy Dust," 1929, 213 pp., $.88, J-5, 6. "Spider Webs and Sunflowers," 1929, 257 pp., $.88, J-5, 6. D. C. Heath and Co., 285 Columbus Ave., Boston. Accurate information about ants, bees and spiders in imaginative setting.

Pratt, Henry Sherring: "A Manual of the Common Invertebrate Animals Exclusive of Insects," A. C. McClurg and Co., 333 E. Ontario St., Chicago. 1916, 737 pp., $5.00, HS or C. Most valuable book for the group.

Pycraft, W. P.: "The Sea Shore," The Macmillan Co., 60 Fifth Ave., New York City. 1920, 156 pp., $2.00, A.

Robertson-Miller, Ellen: "Butterfly and Moth Book," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1920, 249 pp., $2.50, J-7 to 12. Studies and observations of the more familiar species.

Root, A. I., and E. R.: "ABC and XYZ of Bee Culture," The A. I. Root Co., Medina, Ohio. New edition, 1929, 815 pp., $2.50, A. Exhaustive treatment of the subject.

Sanderson, E. Dwight, and Peairs, L. M.: "Insect Pests of Farm, Garden and Orchard," John Wiley and Sons, Inc., 440 Fourth Ave., New York City. Second edition, 1921, 707 pp., $4.50, A. Good general economic manual grouping insects according to food plants.

Schwartz, Julia A.: "Grasshopper Green's Garden," Little, Brown and Co., 34 Beacon St., Boston. 1925, 197 pp., $.80, J-4. Interesting sketches of the life histories of common garden insects and other invertebrates.

Sharp, Dallas Lore: "Spirit of the Hive," Harper and Brothers, 49 E. 33rd St., New York City. 1926, 240 pp., $2.50, A. Philosophic contemplations of a bee-keeper, written in Sharp's delightful style.

Slingerland, Mark Vernon, and Crosby, Cyrus Richard: "Manual of Fruit Insects," The Macmillan Co., 60 Fifth Ave., New York City. 1914, 503 pp., $3.50, A. Comprehensive reliable accounts with selected bibliographies for each species.

WASHBURN, F. L.: "Injurious Insects and Useful Birds," J. B. Lippincott Co., Washington Sq., Philadelphia. Second edition. 1925, 452 pp., $3.00, A. A well-illustrated general work unusual among entomologies.

WEED, CLARENCE M.: "Butterflies Worth Knowing," Little Nature Library, Doubleday, Doran and Co., Garden City, New York. 1922, 286 pp., $2.50, A or J. Popular butterfly book.

WEED, CLARENCE M.: "Insect Ways," D. Appleton and Co., 35 W. 32nd St., New York City. 1930, 325 pp., $1.36, J-6, 7. Non-technical accounts of insect life.

WELLHOUSE, WALTER HOUSLEY: "How Insects Live," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 435 pp., $5.00, A. Interesting for general reading, with comprehensive keys for recognition of larvae.

WHEELER, WILLIAM MORTON: "Ants, Their Structure, Development, and Behavior," Columbia University Press, 2960 Broadway, New York City. New edition. 1926, 663 pp., $7.50, A. A comprehensive philosophical discussion of this large and interesting group.

WHEELER, WILLIAM MORTON: "Foibles of Insects and Men," Alfred A. Knopf, Inc., 730 Fifth Ave., New York City. 1928, 228 pp., $5.50, A. An unusual, interesting book, making general philosophical comparisons between men and insects.

WHEELER, WILLIAM MORTON: "Social Life Among the Insects," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1923, 375 pp., $4.00, A. An exceedingly interesting, comprehensive philosophical account.

Mammals

—————— "Mammals of America," "Mammals of Other Lands," The University Society, Inc., 468 Fourth Ave., New York City. Vol. 4 and Vol. 5 of the Nature Lovers Library, $5.75 each, or Vols. 1-4, $23.00, A. See General References on Animal Life.

ANTHONY, H. E.: "Field Book of North American Mammals," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 626 pp., $5.00, A. Popular handbook for study of both land and marine mammals.

CARTER, WILLIAM HARDING: "The Horses of the World," National Geographic Society, Washington, D. C. 1923, 118 pp., $3.00, A and J. Well-illustrated book covering history, development and breeds of horses.

CUNNINGHAM, A. B.: "Animal Tales of the Rockies," The Abingdon Press, 150 Fifth Ave., New York City. 1925, 122 pp., $1.00, A or J. Tales of animals based on personal observations of the author.

DOWNING, ELLIOT R.: "Elementary Eugenics," University of Chicago Press, Chicago. 1928, 137 pp., $1.75, A. A clear, sane presentation of heredity, designed for young folks.

FUERTES, LOUIS AGASSIZ, and Others: "The Book of Dogs; an Intimate Study of Mankind's Best Friend," National Geographic Society, Washington, D. C. 1923, 110 pp., $3.00, A and J. An excellently illustrated, useful book.

GREGORY, TAPPAN: "Deer at Night in the North Woods," Charles C. Thomas, Springfield, Ill. 1930, $4.00, 212 pp., A. A record in words and splendid photographs of some twenty years of experience photographing wild animals at night.

HILL, LEONARD, and CAMPBELL, ARGYLL: "Health and Environment," Longmans, Green and Co., 55 Fifth Ave., New York City. 1925, 217 pp., $5.00, A. Readable reference on the subject.

Hornaday, William T.: "The Minds and Manners of Wild Animals," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1922, 328 pp., $2.50, J-8 to 12, A. Interesting discussions of behavior of animals.

Howell, A. Brazier: "Aquatic Mammals," Charles C. Thomas, Springfield, Ill. 1930, 332 pp., $5.00, A. A comprehensive and valuable work, written in narrative style and in non-technical language.

Ingersoll, Ernest: "The Life of Animals: The Mammals," The Macmillan Co., 60 Fifth Ave., New York City. 1917, 555 pp., $2.00, A. Concise life histories, illustrated.

Jennings, H. S.: "The Biological Basis of Human Nature," W. W. Norton and Co., Inc., 70 Fifth Ave., New York City. 1930, 384 pp., $4.00, A. An outstanding discussion of the application of knowledge concerning heredity and development to the problems of mankind.

Jennison, George: "Natural History Animals," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 344 pp., $4.50, A and J. A profusely illustrated "who's who" of the animal world.

Lemmon, Robert S.: "About Your Dog," Frederick A. Stokes Co., 433-449 Fourth Ave., New York City. 1928, 245 pp., $2.00, A. A good pet book.

Moseley, Edwin Lincoln: "Our Wild Animals," D. Appleton and Co., 35 W. 32nd St., New York City. 1927, 310 pp., $1.20, J-6, 7. Accurate information about most of the wild mammals common to North America.

Nelson, Edward W.: "Wild Animals of North America: Intimate Studies of Big and Little Creatures of the Animal Kingdom," National Geographic Society, Washington, D. C. 1918, 240 pp., $3.00, A and J. Superior illustrations in color by L. A. Fuertes and splendid track studies by Ernest Thompson Seton.

Newell, D. M.: "American Animals," P. F. Volland Co., Joliet, Ill., 1929, 80 pp., $1.00, J-2, 3. Probably the best nature study in rhyme, cleverly illustrated.

Osborn, H. F.: "Men of the Old Stone Age," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1919, 559 pp., $5.00, A. Standard reference on prehistoric life.

Popenoe, Paul: "Problems of Human Reproduction," The Williams and Wilkins Co., Baltimore, Md. 1926, 218 pp., $2.50, A. Simply written for the general reader.

Rossell, Leonard: "Tracks and Trails," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 137 pp., $1.25, A or J. Track studies in story form, well-illustrated with photographs and artistic sketches by the author.

Sanders, Alvin Howard: "Cattle of the World," National Geographic Society, Washington, D. C. 150 pp., $3.00, A and J. Illustrated narrative of origin, history and economic place of our modern cattle.

Seton, Ernest Thompson: "Animals" (The Nature Library), Doubleday, Doran and Co., Garden City, New York. New edition, 1926, 299 pp., A. Popular information about several groups of American mammals.

Seton, Ernest Thompson: "Lives of Game Animals," Doubleday, Doran and Co., Garden City, New York. 1929, 8 vols., $40.00, A. Best popular scientific treatment of American mammals.

Stephens, Frank: "California Mammals," West Coast Publishing Co., San Diego, Calif. 1906, 351 pp., $3.50, A. A technical work, one of the West Coast Nature Series.

Stoner, Dayton: "The Rodents of Iowa," Bulletin 5, Iowa Geological Survey, Des Moines, Iowa. 1918, 172 pp., A. Accurate information about habits, characters, distribution and economic importance.

WARREN, EDWARD W.: "The Beaver: Its Works and Ways," Williams and Wilkins Co., Baltimore, Md. 1927, 177 pp., $1.00, A or J-8. Simple authentic information copiously illustrated.

WARREN, SHIELDS: "Medical Science for Everyday Use," Lea and Febiger, 600 S. Washington Sq., Philadelphia. 1927, 178 pp., $2.00, A. Sane discussion in simple terms of modern medical science and of the more common diseases.

WRIGHT, MRS. MABEL OSGOOD: "Four-footed Americans and their Kin," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 431 pp., $2.00, A or J. New edition of an excellent old book which contains a great deal of valuable information.

Reptiles, Amphibians and Fish

BISHOP, SHERMAN C.: "The Amphibians and Reptiles of Allegany State Park," New York State Museum Handbook 3, New York State Museum, Albany, N. Y. 1927, 141 pp., $.50, A or J. Well-illustrated popular handbook.

BREDER, C. M.: "Field Book of the Marine Fishes of the Atlantic Coast," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 332 pp., $5.00, A. New popular guide.

BRUNING, CHRISTIAN: "Ichthyologischer Bilderatlas," Aquarienfisch Im- und Export Co., Wandsbek (Hamburg) Germany. 1929, 216 pp., A. A picture book of aquarium fish.

DITMARS, RAYMOND L.: "Reptiles of the World," The Macmillan Co., 60 Fifth Ave., New York City. Reissued 1927, 373 pp., $4.00, A. A book of general information.

FEARNOW, E. C.: "Goldfish, Their Care in Small Aquaria and Ponds," Document 980, Commissioner of Fisheries, Washington, D. C. 1924, 16 pp., $.05, J-3 to A. Suggestions valuable to the amateur aquarist.

GOODE, G. BROWN: "American Fishes," L. C. Page and Co., 53 Beacon St., Boston. Revised 1903, 562 pp., $6.00, A. Comprehensive treatment.

GUTHRIE, J. S.: "The Snakes of Iowa," Bulletin. Iowa Agricultural Experiment Station, Ames, Iowa. 1926, 45 pp., A. A summary of the kinds of snakes and their value.

HASSLER, WILLIAM G.: "Reptile Study," Boy Scouts of America, 2 Park Ave., New York City. 1928, 44 pp., $.20, J. Brief handbook.

HAWES, HARRY B.: "My Friend, the Black Bass," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1930, 288 pp., $2.00, A. Practical and entertaining for the sports lover.

HODGE, A. E., and DERHAM, ARTHUR: "Goldfish Culture for Amateurs," (Printed in England), Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1928, 103 pp., $2.00, A. How to breed and rear goldfish in aquaria and ponds.

HODGE, A. E.: "Tropical Aquarium Fishes," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1927, 128 pp., $2.50, A. Descriptions and pictures of kinds of fish, with suggestions as to how to breed and rear them.

INNES, WILLIAM T: "Goldfish Varieties and Tropical Aquarium Fishes, Innes and Sons, 129-139 N. 12th St., Philadelphia. Twelfth edition, 1929, 300 pp., $4.00, A and J. One of the best publications on the subject.

INNES, WILLIAM T.: "The Modern Aquarium," Innes and Sons, 129-139 N. 12th St., Philadelphia. 1928, 64 pp., $1.00, A and J. Abbreviated edition of "Goldfish Varieties and Tropical Aquarium Fishes" by the same author.

Jordan, David Starr: "Fishes," D. Appleton and Co., 35 W. 32nd St., New York City. 1925, 773 pp., $7.50, A. Standard guide.

LaGorce, John Oliver: "Book of Fishes," National Geographic Society, Washington, D. C. 1924, 243 pp., $4.00, A and J. Readable collection of articles and fish biographies, illustrated in color.

Mellen, I. M.: "Fishes in the Home," Dodd, Mead and Co., 443-449 Fourth Ave., New York City. 1927, 178 pp., $2.00, A. Care of aquarium fishes, particularly tropical fishes for the average home.

Pickwell, Gayle, and Hazeltine, Karl, editors: "Frogs, Toads and Salamanders," Department of Natural Science, San Jose State College, San Jose, Calif. 1930, 55 pp., $.25, A. Vol. 1, No. 1, of "Western Nature Study," a quarterly publication, useful in western United States.

Plumley, Ladd: "With the Trout Fly," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1929, 270 pp., $2.00, A. Interesting for fishermen.

Rachow, Arthur: "Tropical Aquariafish Catalogue," Aquarienfisch Im- und Export Co., Wandsbek (Hamburg) Germany. 1927, 152 pp., A. Interesting illustrations with brief descriptions in English.

Rhead, Louis: "The Basses, Fresh Water and Marine," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1905, 238 pp., $3.50, A.

Townsend, C. H.: "Public Aquarium: Its Construction, Equipment and Management," Document 1045, Commissioner of Fisheries, Washington, D. C. 1928, 91 pp., $.25, A. Based largely on the methods of the large public aquarium in New York.

Van Denburgh, John: "The Reptiles of Western North America," California Academy of Sciences, San Francisco. 1922, Vol. 1, 1028 pp., vol. 2, 611 pp., $10.00 each, A. Fine illustrations with accurate descriptions and interesting accounts of habits of lizards, (Vol. 1) and snakes and turtles, (Vol. 2).

Wright, A. H.: "Frogs: Their Natural History and Utilization," Document 888, Commissioner of Fisheries, Washington, D. C. 1920, 44 pp., $.15, J-6 to A. Very good life history studies, splendidly illustrated.

Wright, Albert Hazen: "Life Histories of North American Anura: The Anura of Ithaca, N. Y.," Carnegie Institution, Washington, D. C. 1914. 105 pp., $2.00, A. Splendidly illustrated detailed life histories of frogs and toads.

Wright, Albert Hazen: "Synopsis and Description of North American Tadpoles," Government Printing Office, Washington, D. C. 1929, 70 pp., A. Probably the most complete treatment of the subject.

PLANT LIFE

General References and Manuals

Atkinson, George Francis: "First Studies in Plant Life," Ginn and Co., 15 Ashburton Pl., Boston. 1901, 266 pp., $.84, J-7 to 9. An illustrated book designed to present simply the life processes of plants.

Bailey, Liberty Hyde: "Manual of Cultivated Plants," The Macmillan Co., 60 Fifth Ave., New York City. 1924, 891 pp., $7.00, A. Standard handbook for the group.

Britton, N. L., and Brown, A.: "Illustrated Flora of Northern United States, Canada and the British Possessions," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1913, 3 vols., $13.50, HS or A. New edition of a complete illustrated manual.

Campbell, Douglas Houghton: "An Outline of Plant Geography," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 392 pp., $4.00, A. A storehouse of information for those interested in the origin of cultivated plants.

Clements, F. E., and E. S.: "Flower Families and Ancestors," H. W. Wilson Co., 950-972 University Ave., New York City. 1928, 156 pp., $2.40, A or J. An interesting and well-illustrated introduction to the study of plants and plant relationships.

Cloud, Dorothy: "The Culture of Perennials," Dodd, Mead and Co., 443-449 Fourth Ave., New York City. 1925, 271 pp., $2.50, A.

Clute, Willard N.: "A Dictionary of American Plant Names," Willard N. Clute and Co., Butler University, Indianapolis, Ind. 1926, 215 pp., $4.25, A. Useful in locating plants of eastern America by common names.

Coulter, John M.: "Plant Life and Plant Uses," American Book Co., 88 Lexington Ave., New York City. 1913, 480 pp., $1.68, A. The work of a recognized authority.

Coulter, John M., and Nelson O.: "A New Manual of Botany of the Central Rocky Mountains," American Book Co., 88 Lexington Ave., New York City. 1909, 646 pp., $2.60, A.

Cowles, H. C., and Coulter, J. G.: "Spring Flora," American Book Co., 88 Lexington Ave., New York City. 1915, 144 pp., $.72, A. Keys to eastern plants.

Cridland, Robert B.: "Practical Landscape Gardening," A. T. De La Mare Co., Inc., 438-448 W. 37th St., New York City. 1927, 276 pp., $2.50, A. Planned "for the owner of a modest home."

Dana, Mrs. W. S.: "Plants and Their Children." American Book Co., 88 Lexington Ave., New York City. 1924, 272 pp., $.76, J-5. New edition of a useful old book of plant study by seasons.

Davidson, George L.: "Flora of Southern California," Times-Mirror Printing and Binding House, 118 S. Broadway, Los Angeles, Cal. 1923, 452 pp., $3.00, A. Good manual for the region.

Dixon, Royal: "The Human Side of Plants," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1914, 201 pp., $2.00, A. Popular treatment of plant habits.

Durand, Herbert: "Wild Flowers and Ferns, in their Homes and in our Gardens," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 394 pp., $3.50, A. Revised and enlarged edition of a book concerned with wild plants and their culture.

Duncan, F. M., and Duncan, L. T.: "Wonders of Plant Life," Oxford University Press, 114 Fifth Ave., New York City. 6 vols., 1928-29, 76 to 80 pp., each, $.35 each, J or A. "The Story of the Plants," "Land and Water Plants," "Some Curious Plants," "Plant Traps and Decoys," "Plant Friends and Foes," "Plants and Their Children." Instructive and well-written.

Fultz, Francis M.: "The Fly-Aways and Other Seed Travelers," Public School Publishing Co., Bloomington, Ill. 1909, 186 pp., $.75, J-4 to 6. An interesting little book on seed dissemination.

Gray, Asa: "How Plants Grow, with a Popular Flora," American Book Co., 88 Lexington Ave., New York City. 233 pp., $1.00, J-7. Profusely illustrated help, especially in learning botanical terms.

Gray, Asa: "New Manual of Botany," American Book Co., 88 Lexington Ave., New York City. 1908, 926 pp., $3.00, A. The classic manual for the central and northeastern United States and adjacent Canada.

GRAY, ASA: "Lessons in Botany," American Book Co., 88 Lexington Ave., New York City. 1887, 226 pp., $1.28, A. A clearly-illustrated, understandable "grammar and dictionary" for use with manuals of botany.

HARDY, MARCEL E.: "The Geography of Plants," Oxford University Press, 114 Fifth Ave., New York City. 1920, 339 pp., $2.50, A. A discussion of the conditions in which plants flourish and their distribution in the great geographical divisions of the earth.

HOTTES, ALFRED: "1001 Garden Questions Answered," A. T. De La Mare Co., Inc., 438-448 W. 37th St., New York City. 1926, 320 pp.; postpaid, cloth, $2.15, paper, $1.65; A. A guidebook to daily operations, covering the flower, vegetable and fruit garden.

JEPSON, W. L.: "Manual of the Flowering Plants of California," Associated Students Store, Berkeley, Calif. 1925, 1238 pp., $7.50, A. Technical work for the west.

KEELER, HARRIET L.: "Our Northern Autumn," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1920, 194 pp., $2.00, HS or A. Delightful, accurate discussion of the flowers, foliage, nuts and fruits of autumn.

KENLY, JULIE CLOSSON: "Green Magic," D. Appleton and Co., 35 W. 32nd St., New York City. 1930, 184 pp., $.92, J-4 to 8. Fascinating presentation of botanical knowledge, interestingly illustrated by wood-cuts.

LINDSAY, T. S.: "Plant Names; Where They Come From," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 93 pp., $1.00, A. Origin and meaning of many plant names.

LOUNSBERRY, ALICE: "Southern Wild Flowers and Trees," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1901, 570 pp., $5.00, A. Good handbook for the southeast.

LOVELL, JOHN H.: "The Flower and Bee: "Plant Life and Pollination," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1918, 286 pp., $2.00, A. An interesting study on the life relations of flowers and the behavior of their insect pollinators.

McDOUGALL, W. B.: "Plant Ecology," Lea and Febiger, S. Washington Sq., Philadelphia. 1927, 326 pp., $3.00, A. A brief treatment of the entire field of plant ecology.

PARKER, BERTHA MORRIS, and COWLES, HENRY CHANDLER: "The Book of Plants," Houghton, Mifflin and Co., 2 Park St., Boston. 1925, 252 pp., $.88, J-6 to 8. Fundamentals of plant life simply, accurately and interestingly expressed.

PETERSON, M. G.: "How to Know Wild Fruits," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 337 pp., $2.00, A. Reissue of an older book, probably the only one of its kind.

QUEAR, CHARLES L.: "School and Home Gardens," University Publishing Co., Lincoln, Neb. 1928, 248 pp., $1.00, J-5, 6, 7. A manual of gardening and garden plants for children of elementary school age.

SARGENT, FREDERICK L.: "Plants and their Uses," Henry Holt and Co., 1 Park Ave., New York City. 1913, 606 pp., $1.60, A. Botany approached from the study of plants of everyday use.

SAUNDERS, CHARLES FRANCIS: "Useful Wild Plants of the United States and Canada," Robert M. McBride and Co., 7 W. 16th St., New York City. 1926, 273 pp., $3.50, A. New edition of a good book.

SAUNDERS, CHARLES FRANCIS: "With the Flowers and Trees in California," Robert M. McBride and Co., 7 W. 16th St., New York City. 1923, 286 pp., $3.00, A.

SEDGWICK, MABEL C.: "The Garden Month by Month," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1907, 516 pp., $8.50, A. Beautifully illustrated guide in which perennials are classified according to color and time of blooming.

SHELTON, LOUISE: "The Seasons in a Flower Garden," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1906, 117 pp., $2.00, HS or A. Simple guide, emphasizing succession of flowering through the seasons.

SMALL, JOHN KUNKEL: "Flora of the Southeastern United States," John Kunkel Small, New York City. 1913, 1370 pp., $5.00, A. Best manual for the southeast.

STEVENS, F. L., and HALL, J. G.: "Diseases of Economic Plants," The Macmillan Co., 60 Fifth Ave., New York City. Revised edition, 1921, 507 pp., $3.90, A. Useful manual.

STEVENS, WILLIAM CHASE: "Introduction to Botany," D. C. Heath and Co., 285 Columbus Ave., Boston. 1902, 446 pp., $1.96, A, (HS and C). Good text, including key and flora.

THORNTON, ARCHIE: "Rock Garden Primer," A. T. De La Mare Co., Inc., 438-448 W. 37th St., New York City. 1929, 132 pp., $2.00, A. For use in the temperate region of America.

TRANSEAU, E. N.: "Science of Plant Life," World Book Co., Yonkers-on-Hudson, N. Y. 1919, 336 pp., $1.68, HS. One of the best texts for the half year course in botany.

WAUGH, F. A.: "Landscape Gardening," John Wiley and Sons, Inc., 440 Fourth Ave., New York City. 1922, 344 pp., $5.00, A.

WEAVER, J. E., and CLEMENTS, F. E.: "Plant Ecology," McGraw-Hill Book Co., 370 Seventh Ave., New York City. 1929, 250 pp., $5.00, A. Comprehensive textbook for college level.

WHITE, EDWARD A.: "The Principles of Flower Arrangement," A. T. De La Mare Co. Inc., 438-448 W. 37th St., New York City. 1926, 225 pp., $3.15 postpaid, A. Useful to those who wish to display flowers effectively.

WODELL, HELEN PAGE: "Beginning to Garden," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 104 pp., $2.00, J. A child's guide for gardening.

WRIGHT, MABEL OSGOOD: "Flowers and Ferns in their Haunts," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 358 pp., $2.00, A and J. A reissue of a useful, interestingly written book.

WRIGHT, RICHARDSON: "The Gardener's Bed Book," J. B. Lippincott Co., Washington Sq., Philadelphia. 1929, 341 pp., $2.50, A. Day-by-day hints for gardeners, together with entertaining observations and bits of philosophy.

WRIGHT, RICHARDSON: "The Practical Book of Outdoor Flowers," J. B. Lippincott Co., Washington Sq., Philadelphia. 1924, 319 pp., $7.50, A. A chatty, but authoritative discussion of flower gardens.

Fungi, Bacteria, Ferns and Other Flowerless Plants

BROADHURST, JEAN: "Bacteria in Relation to Man," J. B. Lippincott Co., Washington Sq., Philadelphia. 1925, 306 pp., $3.00, A. Well-illustrated text for beginners in the study of microbiology.

CHUPP, CHARLES: "Manual of Vegetable Garden Diseases," The Macmillan Co., 60 Fifth Ave., New York City. 1925, 647 pp., $5.00, A. Useful illustrated book.

CLUTE, WILLARD N.: "Fern Allies of North America," Willard N. Clute and Co., Butler University, Indianapolis, Ind. 1928, 278 pp., $4.00, A. Best popular guide on the subject.

CLUTE, WILLARD NELSON: "Our Ferns in their Haunts," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1901, 332 pp., $3.50, A.

DUGGAR, B. M.: "Mushroom Growing," Orange Judd Publishing Co., Inc., 15 E. 26th St., New York City. 1925, 250 pp., $2.00, A. Detailed treatment of subject.

DUGGAR, B. M.: "Fungous Diseases of Plants," Ginn and Co., 15 Ashburton Pl., Boston. 1909, 508 pp., $3.20, A. College text, useful for reference.

DUNHAM, ELIZABETH M.: "How to Know the Mosses," Houghton, Mifflin and Co., 2 Park St., Boston. 1916, 287 pp., $2.50, A. Useful popular guide to the mosses of northeastern United States.

DURAND, HERBERT: "Field Book of Common Ferns," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 220 pp., $2.50, A. Popular guide.

EALAND, C. A.: "The Romance of the Microscope," J. B. Lippincott Co., Washington Sq., Philadelphia. 1921, 314 pp., $3.00, A. Readable story.

GREAVES, JOSEPH E. and ETHELYN O.: "Elementary Bacteriology," W. B. Saunders Co., W. Washington Sq., Philadelphia. 1928, 506 pp., $3.50, A. Useful as a high school text and household reference.

GROUT, A. J.: "Mosses with a Hand-lens and Microscope," A. J. Grout, New Brighton, Conn. 1924, 339 pp., $7.00, A. Technical work.

GÜSSOW, H. T., and ODELL, W. S.: "Mushrooms and Toadstools," The Dominion Botanist, Central Experimental Farm, Ottawa, Can. 1927, 274 pp., $1.00, A. An excellently illustrated non-technical handbook, an outstanding buy.

HESLER, LEX R., and WHETZEL, HERBERT HICE: "Manual of Fruit Diseases," The Macmillan Co., 60 Fifth Ave., New York City. 1917, 462 pp., $3.50, A. Standard.

HULL, THOMAS G.: "Diseases Transmitted from Animals to Man," Charles C. Thomas, Springfield, Ill. 1930, 352 pp., $5.50, A. Historical background and prevention.

MACBRIDE, THOMAS H.: "The North American Slime-Moulds," The Macmillan Co., 60 Fifth Ave., New York City. 1922, 354 pp., $3.00, A. Standard reference.

MCCUBBIN, W. A.: "Fungi and Human Affairs," World Book Co., Yonkers-on-Hudson, N. Y. 1924, 111 pp., $1.00, J-7, 8, 9. Very good for general use.

MCFARLAND, JOSEPH: "Fighting Foes Too Small to See," F. A. Davis Co., 1914 Cherry St., Philadelphia. 1924, 309 pp., $2.50, A. Excellent popular work on microbiology.

MCKENNY, MARGARET: "Mushrooms of Field and Wood," John Day Co., Inc., 385 Fourth Ave., New York City. 1929, 193 pp., $2.00, A. Guide for popular use.

PARSONS, FRANCES THEODORA: "How to Know the Ferns," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1922, 215 pp., $2.50, HS and A. A complete manual, concisely and interestingly written.

PETER, W. W., and HALLOCK, GRACE T.: "Hitch-hikers" (organisms of communicable disease), Cleanliness Institute, 45 E. 17th St., New York City. Free to health leaders and teachers who request them; single copy $.20; reduced prices for purchases in quantity. Graphic accounts of routes of transmission of disease and their control.

ROLFE, R. T., and ROLFE, F. W.: "The Romance of the Fungus World," J. B. Lippincott Co., Washington Sq., Philadelphia. 1928, 309 pp., $4.00, A. Reissue of an interesting book.

STEVENS, F. L., and HALL, J. G.: "Diseases of Economic Plants," The Macmillan Co., 60 Fifth Ave., New York City. 1920, 507 pp., $3.90, A. Useful manual.

THOMAS, WILLIAM STURGIS: "Field Book of Common Gilled Mushrooms," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 332 pp., $3.50, A. Popular handbook.

TILTON, GEORGE H.: "The Fern Lover's Companion," Little, Brown and Co., 34 Beacon St., Boston, 1922, 239 pp., $3.00, A. Very generally accepted popular illustrated handbook.

Flowering Herbs

ABRAMS, LEROY: "Flora of Los Angeles and Vicinity," Stanford Bookstore, Stanford University, Calif. 1917, 432 pp., $2.25, A. Good manual for the region.

ARMSTRONG, MARGARET: "Fieldbook of Western Flowers," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1927, 596 pp., $3.50, A. Good for the region.

BAKER, MARY FRANCES: "Florida Wild Flowers," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 256 pp., $3.00, A. Well-illustrated guide.

BLANCHAN, NELTJE: "Nature's Garden," Doubleday, Doran and Co., Garden City, N. Y. 1905, 415 pp., $5.00, A. Illustrated popular information about common wild flowering plants.

BURGESS, THORNTON W.: "Flower Book for Children," Little, Brown and Co., 34 Beacon St., Boston. 1923, 350 pp., $3.00, J. Beautifully illustrated work presenting flowers in story setting.

CHASE, A.: "First Book of Grasses," The Macmillan Co., 60 Fifth Ave., New York City. 1922, 121 pp., $1.25, A. A book of twelve lessons based on the commoner species for the beginning student of the group.

CLEMENTS, EDITH S.: "Flowers of Coast and Sierra," H. W. Wilson Co., 950-972 University Ave., New York City. 1928, 226 pp., $3.00, A. Attractive non-technical guide for western flowers.

CLEMENTS, FREDERIC E. and EDITH S.: "Rocky Mountain Flowers," H. W. Wilson Co., 950-972 University Ave., New York City. Third edition. 1928, 390 pp., $3.50, A. Simple, full keys and descriptions for use from the Canadian Rockies to Arizona and New Mexico.

CLEMENTS, FREDERIC E. and EDITH S.: "Flowers of Mountain and Plain," H. W. Wilson Co., 950-972 University Ave., New York City. Second edition, enlarged, 1928, 55 pp., $2.00, A. A convenient guide book for flowers of the West.

DOUBLEDAY, NELTJE BLANCHAN: "Wild Flowers," Doubleday, Doran and Co., Garden City, N. Y. 1926, 270 pp., $3.50, A or J. A popular edition adapted from "Nature's Garden," by Asa D. Dickinson.

DURAND, HERBERT "My Wild Flower Garden," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1927, 242 pp., $2.50, A. Charming description of the making of a wild flower garden.

GEORGIA, ADA E.: "Manual of Weeds," The Macmillan Co., 60 Fifth Ave., New York City. 1914, 593 pp., $3.00, A. The best and most comprehensive manual on the subject.

Henshaw, Julia W.: "Wild Flowers of the North American Mountains," Robert M. McBride and Co., 7 W. 16th St., New York City. 1915, 383 pp., $4.00, A.

Hottes, A. C.: "The Book of Annuals," A. T. De La Mare Co., Inc., 438-448 W. 37th St., New York City. 1928, 182 pp., $1.65 postpaid, A. Profusely illustrated guide for use by the gardener.

Hottes, Alfred C.: "The Book of Perennials," A. T. De La Mare Co., Inc., 438-448 W. 37th St., New York City. 1927, 200 pp., cloth, $1.65, postpaid, A. General culture, and lists of perennials suited for different locations and purposes.

House, Homer D.: "Wild Flowers of New York," Memoir 15, New York State Museum, Albany, N. Y. 1918, 2 vols., 362 pp., plus excellent color plates, $7.00, A and J. Color plates may be secured separately. A splendid buy.

Keeler, Harriet L.: "Our Garden Flowers," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1910, 550 pp., $3.00, HS and A. Illustrated and full of interesting information.

Keeler, Harriet L.: "Wayside Flowers of Summer," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1917, 288 pp., $2.00, HS or A. Interesting observations of common flowers of fields and roadsides.

Keeler, Harriet L.: "Our Early Wild Flowers," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1916, 252 pp., $2.00, HS or A. Helpful for identification and interesting in content.

King, Mrs. Francis: "The Flower Garden Day by Day," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1927, 210 pp., $1.50, A. Good reading.

King, Mrs. Francis: "The Little Garden," 1921, 94 pp., $1.75, A. "Variety in the Little Garden," 1923, 120 pp., $1.75, A. Atlantic Monthly Press, Boston. Good reading.

Lounsberry, Alice: "Guide to Wild Flowers," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1899, 347 pp., $5.00, A. Popular book.

Mathews, F. Schuyler: "Fieldbook of American Wild Flowers," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 558 pp., $3.50, A. Very useful handbook for identification and as a source of interesting information.

Mathews, F. Schuyler: "Book of Wild Flowers for Young People," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1927, 398 pp., $3.00, J. Well-illustrated talks about wild flowers of each month, beginning with April.

Morris, Frank, and Eames, Edward: "Our Wild Orchids," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1929, 464 pp., $7.50, A. 70 species native to northeastern United States and Canada, beautifully illustrated by photographs.

Pammel, L. H.: "Weed Flora of Iowa," Bulletin 4, Iowa Geological Survey, Des Moines, Iowa. Revised edition. 1926, 715 pp., $1.00, A. Useful almost anywhere.

Parsons, Frances Theodora: "How to Know the Wild Flowers," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1926, 346 pp., $3.00, HS or A. One of the best non-technical guides.

Reed, Chester A.: "Flower Guide, East of the Rockies," Doubleday, Doran and Co., Garden City, N. Y. 1911, 228 pp., cloth, $1.25; imitation leather, $1.50, A or J. Convenient pocket guide.

ROCKWELL, F. F.: "Book of Bulbs," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 264 pp., $3.00, A. Useful reference.

SAUNDERS, CHARLES FRANCIS: "Western Flower Guide," Doubleday, Doran and Co., Garden City, N. Y. 1917, 286 pp., $1.75, A or J. Convenient pocket guide.

SHAW, ELLEN EDDY: "Garden Flowers of Spring," 1917, 230 pp., $1.25, A. "Garden Flowers of Summer," 1917, 251 pp., $1.25, A. "Garden Flowers of Autumn," 1917, 195 pp., $1.25, A. Doubleday, Doran and Co., Garden City, N. Y. Convenient guides.

SHOWALTER, WILLIAM JOSEPH: "The Book of Wild Flowers," National Geographic Society, Washington, D. C. 1924, 243 pp., $4.00, A and J. Colored illustrations and short descriptions.

STACK, FREDERICK M.: "Wild Flowers," Grosset and Dunlap, 1140 Broadway, New York City. 1927, 411 pp., $1.00 plus $.15 postage, J. A good non-technical flower book for children.

TAYLOR, NORMAN: "A Guide to the Wild Flowers East of the Mississippi and North of Virginia," Greenberg Press, 112 East 19th St., New York City. 1929, 357 pp., $3.00, J-12, A. Non-technical keys and descriptions including the most conspicuous flowers of the region.

WALTON, GEORGE L.: "The Flower Finder," J. B. Lippincott Co., Washington Sq., Philadelphia. Third edition. 1930, 419 pp., $3.00, A. Illustrated handbook for use by laymen.

Trees, Shrubs, Woody Vines and Forestry

AMERICAN TREE ASSOCIATION: "The Forestry Primer," "The Forest Poetic," "Tree Planting Book," "Town Forests," "Forestry News Digest," "Common Trees of New Jersey," "Common Trees of New York," "Common Trees of Massachusetts," "Common Trees of Indiana," "Common Trees of Ohio," "Common Trees of Michigan," American Tree Association, Washington, D. C. Valuable material, available for educational purposes upon request.

AMERICAN TREE ASSOCIATION: "Forestry Almanac," American Tree Association, Washington, D. C. 1926, 348 pp., $1.00, A. Survey.

APGAR, AUSTIN C.: "Ornamental Shrubs of the United States," American Book Co., 88 Lexington Ave., New York City. 1910, 352 pp., $1.60, A. A popular guide which includes most shrubs in general cultivation.

APGAR, AUSTIN C.: "Trees of the Northern United States," American Book Co., 88 Lexington Ave., New York City. 1920, 224 pp., $1.20, A. A manual useful to those with little knowledge of technical botany.

BAILEY, LIBERTY HYDE: "The Apple Tree," The Macmillan Co., 60 Fifth Ave., New York City. 1922, 117 pp., $1.50, A. A delightful means of gaining acquaintance with apple trees.

BERRY, J. B.: "Northern Woodlot Trees," 1924, 214 pp., $1.20, A. "Southern Woodland Trees," 1924, 214 pp., $1.20, A. "Western Forest Trees," 1924, 212 pp., $1.20, A. World Book Co., Yonkers-on-Hudson, N. Y. Popular handbooks.

BERRY, EDWARD W.: "Tree Ancestors," Williams and Wilkins Co., Baltimore, Md. 1923, 270 pp., $3.00, A. Trees against the background of time.

BERRY, JAMES B.: "Farm Woodlands," World Book Co., Yonkers-on-Hudson, N. Y. 1923, 425 pp., $2.00, A. Textbook of farm forestry.

Blakeslee, Albert Francis, and Jarvis, C. D.: "Trees in Winter, Their Study, Planting, Care and Identification," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 446 pp., $2.50, A or J. Well-illustrated handbook showing buds, bark and habit of trees of northeastern United States.

Boerker, R. H. D.: "Our National Forests," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 238 pp., $2.50, A. Reissued. Readers' guide to national forests.

Boy Scouts of America: "Forestry," Boy Scouts of America, 2 Park Ave., New York City. Merit badge series, 1929, 45 pp., $.20, J and A. Brief cross-section of forestry problem.

Brown, H. P.: "Trees of New York State, Native and Naturalized," Technical Publication, No. 15, New York State College of Forestry, Syracuse University, Syracuse, N. Y. 1921, 401 pp., $1.00, A. Useful manual, illustrated with drawings of leaves, twigs, flowers and fruit.

Cheyney, E. G., and Wentling, J. P.: "The Farm Woodlot," The Macmillan Co., 60 Fifth Ave., New York City. 1926, 349 pp., $2.50, A. Second edition of a useful manual.

Comstock, Anna Botsford: "Trees at Leisure," Slingerland-Comstock Co., Ithaca, N. Y. 1916, 56 pp., $1.00, A. A delightful help to appreciation of trees in winter.

Curtis, Carlton C.: "A Guide to the Trees," Greenberg Press, 112 E. 19th St., New York City. 1928, 208 pp., $2.00, A. Clear descriptions, and a simple key based on leaves.

Curtis, Mary I.: "Stories in Trees," Lyons and Carnahan, 221 E. 20th St., Chicago. 1925, 217 pp., $.88, J-5. Legends, poems and facts about trees.

Dixon. Royal: "The Human Side of Trees," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1917, 199 pp., $2.00, A or J. Tree philosophy.

Dorrance, J. Gordon: "The Story of the Forest," American Book Co., 88 Lexington Ave., New York City. 1916, 237 pp., $.68, J-4. Simple presentation of facts about trees and forestry.

Edgerton, Mrs. D. Priscilla: "The Forest: A Handbook for Teachers," Misc. Circular 98, Superintendent of Documents, Government Printing Office, Washington, D. C. 1927, 72 pp., $.30 for single copy, $.075 a copy when purchased in lots of 100 or more. Outlines by grades, supplementary exercises and helpful suggestions for the study of trees and forestry.

Emerson, Arthur I., and Weed, Clarence M.: "Our Trees: How to Know Them," J. B. Lippincott Co., Washington Sq., Philadelphia. Fifth edition. 1918, 295 pp., $5.00, A. Notes on characteristics, distribution and culture, with photographs from nature.

Felt, E. P.: "Manual of Tree and Shrub Insects," The Macmillan Co., 60 Fifth Ave., New York City. 1924, 382 pp., $3.50, A. Excellent popular science book on this important ecological group.

Frear, Mary Dillingham: "Our Familiar Island Trees," Richard G. Badger, Publisher, 194 Boylston St., Boston, Mass. 1929, 161 pp., $1.50, A. A small guide to trees, shrubs, and vines of Hawaii.

Hawksworth, Hallam: "A Year in the Wonderland of Trees," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1926, 214 pp., $1.00, J-6 to 8. Interestingly written material for month-by-month study of trees.

Hottes, Alfred C.: "The Book of Shrubs," A. T. De La Mare Co., Inc., 438-448 W. 37th St., New York City. 1928, 371 pp., $3.15 postpaid, A. Adapted to the needs of all who have to do with shrubs.

HOUGH, ROMEYN B.: "Handbook of Trees of the Northern States and Canada," Romeyn B. Hough Co., Lowville, N. Y. Fourth edition, 1924, 470 pp., $8.00, A. Excellent photographs of leaves, fruits and twigs, made to scale. Maps showing area of distribution.

HOUGH, ROMEYN B.: "Leaf Key to the Trees," Romeyn B. Hough Co., Lowville, N. Y. 1910, 63 pp., $.75, A. Small pocket guide.

HUNTINGTON, ANNIE OAKES: "Studies of Trees in Winter," L. C. Page and Co., 53 Beacon St., Boston. 1919, 198 pp., $3.50, A.

ILLICK, JOSEPH S.: "Tree Habits—How to Know the Hardwoods," The Book Shop, New Cumberland, Pa. Second edition, 1924, 337 pp., $2.00, A. Interesting tree philosophy with photographic illustrations.

ILLICK, JOSEPH S.: "Pennsylvania Trees," Bulletin 11, Pennsylvania Dept. of Forests and Waters, Harrisburg, Pa. 1928, 235 pp., A. Manual for identification of species including some general information about trees.

JEPSON, W. L.: "The Silva of California," University of California Press, Berkeley, Cal. 1910, 480 pp., $6.00, A. Standard manual.

KEELER, HARRIET L.: "Our Native Trees and How to Identify Them," 1915, 533 pp., $3.00, HS, A. "Our Northern Shrubs and How to Identify Them," 1903, 521 pp., $3.00, HS, A. Charles Scribner's Sons, 597 Fifth Ave., New York City. Popular handbooks of common eastern species.

KOEHLER, ARTHUR: "The Identification of Furniture Woods," U. S. D. A. Misc. Circ. 66, United States Department of Agriculture, Washington, D. C. 1926, 78 pp., A. Descriptions and keys for identification of woods commonly used for exposed parts of furniture.

LONGYEAR, BURTON O.: "Rocky Mountain Trees and Shrubs," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1927, 244 pp., $3.50, A. Popular manual.

LOUNSBERRY, ALICE: "A Guide to the Trees," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1900, 313 pp., $5.00, A. Common trees and shrubs, classified according to type of soil in which they grow.

MACSELF, A. J.: "Flowering Trees and Shrubs," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1924, 224 pp., $2.00, A. For use by gardeners rather than botanists.

MADDOX, R. S., and PARKINS, A. E.: "Our Trees and How They Serve Us," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1925, 180 pp., $.84, J-6 to 8. Important facts about trees and forests presented simply.

MADISON. HAROLD L.: "Trees of Ohio and of Northeastern North America." Cleveland Museum of Natural History, 2717 Euclid Ave., Cleveland, Ohio. 1926, 24 pp., $.15, A or J. Pocket guide including leaf drawings and brief descriptions.

MATHEWS, F. SCHUYLER: "Familiar Trees and their Leaves," D. Appleton and Co., 35 W. 32nd St., New York City. 1923, 334 pp., $3.50, J-9, 10. New edition of a useful old book.

MATHEWS, F. SCHUYLER: "The Fieldbook of American Trees and Shrubs," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 465 pp., $3.50, A. Popular handbook with many helpful illustrations.

MCFARLAND, J. H.: "Getting Acquainted with the Trees," The Macmillan Co., 60 Fifth Ave., New York City. 1906, 241 pp., $1.75, A. Popular non-scientific sketches about common trees.

MCFEE, INEZ: "The Tree Book," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1919, 234 pp., $2.00, A. Popular type of handbook

Miller, R. B., and Tehon, L. R.: "The Native and Naturalized Trees of Illinois," State Natural History Survey Division, Urbana, Ill. 1929, 339 pp., J-8 and A. Free to citizens of Illinois. Excellent descriptive manual with identification keys and illustrations from photographs.

Moon, Frederick F.: "The Book of Forestry," D. Appleton and Co., 35 W. 32nd St., New York City. 1916, 315 pp., $3.50, J-9, 10. General view of the forestry profession.

Muenscher, W. C.: "Keys to Woody Plants," W. C. Muenscher, Ithaca, N. Y. Revised edition, 1930, 96 pp., $1.00, A. Useful for those with some background of botanical knowledge.

Otis, Charles H.: "Michigan Trees," University of Michigan, Ann Arbor, Mich. Revised edition, 1926, 247 pp., $.75, A. Manual including descriptions and drawings of leaves, twigs, flowers and fruit.

Pack, Arthur Newton: "Our Vanishing Forests," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 189 pp., $2.00, A. The ethics of civilization's relation to forests.

Pack, Charles Lathrop: "The Forestry Primer," American Tree Association, Washington, D. C. 1926, 32 pp., free, J. Fifteen lessons suitable for use in the higher elementary grades.

Pack, Charles Lathrop: "Trees as Good Citizens," American Tree Association, Washington, D. C. 1922, 257 pp., $4.00, A.

Pack, Charles Lathrop, and Gill, Tom: "Forests and Mankind," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 250 pp., $3.00, A. A comprehensive, humanistic treatment of the subject.

Peets, E.: "Practical Tree Repair," Robert M. McBride and Co., 7 W. 16th St., New York City. 1925, 265 pp., $2.50, A.

Pinchot, Gifford: "The Training of a Forester," J. B. Lippincott Co., Washington Sq., Philadelphia. Third edition, 1917, 157 pp., $1.75, A.

Pinchot, Gifford: "A Primer of Forestry," Farmers' Bulletins 173 and 358, Parts I and II. Superintendent of Documents, Government Printing Office, Washington, D. C. 1903, and 1909, 88 pp., $.05 each. A forerunner of many excellent books.

Rankin, W. Howard: "The Manual of Tree Diseases," The Macmillan Co., 60 Fifth Ave., New York City. 1918, 398 pp., $3.25, A. Standard manual.

Recknagel, A. B.: "The Forests of the State of New York," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 167 pp., $2.50, A.

Recknagel, A. B., and Spring, S. N.: "Forestry," Alfred A. Knopf, 730 Fifth Ave., New York City. 1929, 255 pp., $2.75, A. A comprehensive book designed to give to the reader a broad and general grasp of the forestry problem.

Rehder, Alfred: "Manual of Cultivated Trees and Shrubs," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 930 pp., $10.50, A. Standard, comprehensive manual.

Rogers, Julia Ellen: "Tree Guide," pocket library, Doubleday, Doran and Co., Garden City., N. Y. 1914, 265 pp., $1.25, A or J. Handy but limited in scope.

Rogers, Julia Ellen: "Trees," Grosset and Dunlap, 1140 Broadway, New York City. 1927, 263 pp., $1.00 plus $.15 postage, A or J. Popular information about common trees.

Rogers, Julia Ellen: "Trees Worth Knowing," Doubleday, Doran and Co., Garden City, N. Y. 1917, 291 pp., $2.50. Popular presentation of information about common trees.

Rosendahl, C. O., and Butters, F. K.: "Trees and Shrubs of Minnesota." University of Minnesota Press, Minneapolis, Minn. 1928, 385 pp., $3.00, HS or A. New edition of a valuable descriptive manual.

Sargent, Charles Sprague: "Manual of the Trees of North America," Houghton, Mifflin and Co., 2 Park St., Boston. 1922, 910 pp., $12.50, A. Standard manual for advanced students.

Schaffner, John H.: "Field Manual ot Trees," R. G. Adams and Co., 15th Ave., and High St., Columbus, Ohio. 1926, 154 pp., $1.50, A. Small manual containing keys useful at all seasons in northern United States and southern Canada east of the Rockies.

Somerville, William: "How a Tree Grows," Oxford University Press, 114 Fifth Ave., New York City. 1927, 212 pp., $3.50, A. An ambitious and interesting study of the subject.

Sponsler, O. L.: "A Bud and Twig Key," George Wahr, Ann Arbor, Mich. 1918, 25 pp., $.35, A. A key to the more important broadleaf deciduous trees of the United States.

Sponsler, O. L.: "Trees," George Wahr, Ann Arbor, Mich. 1923, 158 pp., $1.50, A. Well-illustrated, non-technical pocket guide to trees of the Great Lakes region.

Sudworth, George Bishop: "A Check List of Forest Trees of the United States," U. S. D. A. Misc. Circular 92, Superintendent of Documents, Government Printing Office, Washington, D. C. 1927, 295 pp., $.40, A. A list of names and ranges.

Sudworth, George Bishop: "Forest Trees of the Pacific Slope," Superintendent of Documents, Government Printing Office, Washington, D. C. 1908, $.60, A. Principally a list.

Trelease, William: "Plant Materials of Decorative Gardening, The Woody Plants," William Trelease, Urbana, Ill. 1926, 231 pp., $1.25, A. A comprehensive, somewhat technical manual with keys.

Trelease, William: "Winter Botany," William Trelease, Urbana, Ill., 1925, 438 pp., $2.50, A. Excellent illustrated manual for study of woody plants in winter condition.

Van Name, Willard G.: "Vanishing Forest Reserves," Richard G. Badger, Publisher, 194 Boylston St., Boston. 1929, 190 pp., $2.00, A. A challenging discussion of problems of national forests and national parks.

White, J. H.: "The Forest Trees of Ontario," King's Printer, Parliament Buildings, Toronto, Ontario, Can. 1925, 80 pp., plus 30 pp. of halftone illustrations, $.25, A or J. A helpful book for the layman, with excellent illustrations from photographs in addition to keys and descriptions.

Wilson, E. H.: "America's Greatest Garden," Stratford Publishing Co., 289 Congress St., Boston. 1925, 123 pp., $3.00, A. Story of the Arnold Arboretum.

Wilson, E. H.: "Aristocrats of the Garden," 1926, 312 pp., $5.00, A. "More Aristocrats of the Garden," 1928, 288 pp., $5.00, A. Stratford Publishing Co., 289 Congress St., Boston. A general and a specific work on uses, culture and kinds of woody garden and street plants, attractively written.

Wilson, E. H.: "Aristocrats of the Trees," Stratford Publishing Co., 289 Congress St., Boston. 1930, 279 pp., $15.00, A. Historical and philosophic essays on trees, illustrated by full-page photographs.

PHYSICAL SCIENCE

(For Paleontology, see section on "General References and Texts.)

General Manuals

Downing, Elliot R.: "Our Physical World," Longmans, Green and Co., 55 Fifth Ave., New York City. 1925, 367 pp., $2.00, HS and A. A source-book of physical nature study organized about toys and familiar home appliances.

Downing, Elliot R.: "Field and Laboratory Guide in Physical Nature-Study," Longmans, Green and Co., 55 Fifth Ave., New York City. 1924, 109 pp., $1.50, HS and A. A guide for the use of teachers.

Edington, A. S.: "The Nature of the Physical World," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 361 pp., $3.75, A. A readable treatment of recent ideas on this subject.

Jeans, Sir James: "The Universe Around Us," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 341 pp., $4.50, A. A book for laymen written by a distinguished astronomer and physicist.

Earth Study

Bailey, G. E.: "California, a Geologic Wonderland," Times-Mirror Printing and Binding House, 118 South Broadway, Los Angeles, Calif. 1924, 119 pp., $1.65, A.

Brennan, George A.: "The Wonders of the Dunes," Bobbs-Merrill Co., 18 University Sq., Indianapolis, Ind. 1923, 325 pp., $3.00, A. Popular treatment.

Cleland, Herdman F.: "Geology— Physical and Historical," American Book Co., 88 Lexington Ave., New York City. 1929, 720 pp., $3.60, A. College text.

Coleman, A. P.: "Ice Ages," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 296 pp., $3.50, A. History and discussion of glaciation in various parts of the world, with illustrations and maps.

Dana, E. S.: "Minerals and How to Study Them," John Wiley and Sons, Inc., 440 Fourth Ave., New York City. Second edition, 1896, 380 pp., $2.00, A. A good reference for those seriously interested in mineralogy.

Davis, Watson: "The Story of Copper," The Century Co., 353 Fourth Ave., New York City. 1923, 385 pp., $3.00, A. Non-technical book written in popular style.

Fairbanks, H. W.: "Rocks and Minerals," Educational Publishing Corp., 54 Clayton St., Boston. 1921, 236 pp., $1.00, J-8, 9. Common rocks and minerals treated in story form.

Fraser, Chelsea: "Secrets of the Earth," Thomas Y. Crowell Co., 393 Fourth Ave., New York City. 1921, 240 pp., $1.75, J-8. Valuable information, well-given, about geology and minerals.

Grabau, Amadeus W.: "A Textbook of Geology," D. C. Heath and Co., 285 Columbus Ave., Boston. Vol. 1, (General Geology), 864 pp.; Vol. II, (Historical Geology), 976 pp., 1921, $6.00, A (College). Good reference book for teachers.

Hawksworth, Hallam: "The Adventures of a Grain of Dust," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1922, 251 pp., $1.20, J-6 to 8. The story of how nature makes and fertilizes the soil, told in an interesting way.

HAWKSWORTH, HALLAM: "The Strange Adventures of a Pebble," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1921, 296 pp., $1.20, J-6 to 8. Real geologic information given in a very readable form.

HUNTINGTON, ELLSWORTH: "The Human Habitat," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1927, 293 pp., $3.00, A. The effect of geography on man's development, woven into a story of life in many lands.

HUNTINGTON, ELLSWORTH, and CUSHING, SUMNER W.: "Principles of Human Geography," John Wiley and Sons, Inc., 440 Fourth Ave., New York City. Third edition, 1924, 430 pp., $3.00, A. Good reference for technical background.

LEE, WILLIS T.: "Stories in Stone," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1926, 226 pp., $3.00, A. A readable story of earth forms in North America.

LOOMIS, F. B.: "Fieldbook of Common Rocks and Minerals," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 278 pp., $3.50, A. Perhaps the most useful semi-technical guide for laymen.

MARMER, H. A.: "The Sea," 1930, 312 pp., $3.00, A. "The Tide," 1926, 282 pp., $2.50, A. D. Appleton and Co., 35 W. 32nd St., New York City. Readable works by a recognized authority.

MATHER, KIRTLEY F.: "Old Mother Earth," Harvard University Press, Cambridge 38, Mass. 1928, 177 pp., $2.50, A. A very readable popular presentation of historical geology with simple, clear illustrations.

PIRSSON, LOUIS V.: "Rocks and Rock Minerals," John Wiley and Sons, Inc., 440 Fourth Ave., New York City. Second edition, 1926, 426 pp., $3.50, A. A good manual.

PIRSSON, LOUIS V., and SCHUCHERT, CHARLES: "Textbook of Geology," John Wiley and Sons, Inc., 440 Fourth Ave., New York City. Part I, Physical Geology, third edition, 1929, 488 pp., $3.75, A. Part II, Historical Geology, 1924, 724 pp., $4.50, A. College text.

SEERS, A. WADDINGHAM: "The Earth and its Life," World Book Co., Yonkers-on-Hudson, N. Y. 1922, 208 pp., $1.20, J-7, 8 or HS. Compact summary of knowledge of prehistoric plants and animals.

SPENCER, L. J.: "The World's Minerals," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. Revised edition, 1916, 327 pp., $5.00, A. Popular treatment.

Weather and Climate

BARNARD, CHARLES: "Talks about the Weather," Funk and Wagnalls Co., 354-360 Fourth Ave., New York City. 1886, 121 pp., $.75, J-4 to 8.

BLISS, GEORGE S.: "Weather Forecasting," Bulletin 42, U. S. Dept. of Agriculture, Weather Bureau, Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 1929, 28 pp., $.05, A. Authoritative information on the physical properties of the atmosphere and of the principles of forecasting.

BROOKS, C. S.: "Why the Weather," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1924, 310 pp., $2.00, A. Easy readings in meteorology.

BRUNT, DAVID: "Meteorology," Oxford University Press, 114 Fifth Ave., New York City. 1928, 111 pp., $1.00, A. Brief sketch of the physical principles of weather phenomena, written by an English scientist.

Free, E. E., and Hoke, Travis: "Weather," Robert M. McBride and Co., 7 W. 16th St., New York City. 1928, 337 pp., $3.00, A. A popularly written book designed to tell Americans "what weather facts they yearn to know."

Gregg, W. R.: "Aeronautical Meteorology," The Ronald Press Co., 15 E. 26th St., New York City. 1925, 144 pp., $2.50, A. Simple, material on meteorology.

Humphreys, W. J.: "Fogs and Clouds," Williams and Wilkins Co., Baltimore, Md. 1926, 104 pp., $4.00, A (HS). Fine collection of cloud pictures.

Humphreys, W. J.: "Weather," Boy Scouts of America, 2 Park Ave., New York City. Merit badge series, 1929, 73 pp., $.20, J and A. An excellent survey of weather and weather study.

Milham, Willis Isbister: "Meteorology, A Textbook of the Weather," The Macmillan Co., 60 Fifth Ave., New York City. 1912, 549 pp., $4.00, A. A clear understandable text.

Talman, Charles Fitzhugh: "Meteorology, The Science of the Atmosphere," P. F. Collier and Son Company, New York City. 1922, 384 pp., A. Very good popular discussion.

Van Cleef, Eugene: "Story of the Weather," The Century Co., 353 Fourth Ave., New York City. 1929, 280 pp., $2.50, A.

Ward, R. De C.: "Climates of the United States," Ginn and Co., 15 Ashburton Place, Boston. 1925, 518 pp., $4.00, A. Good summary of the subject.

Star and Sky Study

Abbot, Charles G.: "Earth and Stars," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1925, 264 pp. $3.00, A. Comprehensive, authoritative information for general readers as well as students of astronomy.

Abbot, Charles G.: "The Sun," D. Appleton and Co., 35 W. 32nd St., New York City. Revised edition, 1929, 433 pp., $3.50, A. Comprehensive authoritative information for general readers as well as students of astronomy.

Barns, Charles Edward: "1001 Celestial Wonders as Observed with Home-built Instruments," Pacific Science Press, Morgan Hill, Calif. 1928, 273 pp., A. Unique and interesting star and planet study without myths, including directions for making a telescope.

Barritt, Leon: "The Barritt-Serviss Star and Planet Finder," Leon Barritt, 367 Fulton St., Brooklyn, N. Y. $5.00, A. A very desirable simple, practical device for locating the heavenly bodies.

Barritt, Leon: "The Monthly Evening Sky Map," Leon Barritt, 367 Fulton St., Brooklyn, N. Y. $1.50 per year. The sun, moon and planets in relation to the stars each month.

Barton, S. G. and Barton, W. H.: "A Guide to the Constellations," McGraw-Hill Book Co., 370 Seventh Ave., New York City. 1928, 74 pp., $2.50, A or J. Large sky charts, with useful explanatory and descriptive text.

Chant, Clarence A.: "Our Wonderful Universe," World Book Co., Yonkers-on-Hudson, N. Y. 1929, 191 pp., $1.52, J-7. 8, 9 and up. One of the best and most understandable introductory studies of the heavens, excellently illustrated.

Collins, A. Frederick: "The Book of Stars," D. Appleton and Co., 35 W. 32nd St., New York City. 1920, 230 pp., $1.50, J-6, 7, 8. Practical book for children's use.

Comstock, Anna Botsford: "Star Maps," Slingerland-Comstock Co., Ithaca, N. Y. 1922, $.25.

Fabre, J. H.: "The Heavens," J. B. Lippincott Co., Washington Sq., Philadelphia. 1925, 336 pp., $5.00, A. Delightful and authoritative reading.

Hadley, Theodosia: "The Sky Book," Slingerland-Comstock Co., Ithaca, N. Y. 1929, 175 pp., $.75, A. Handy guide for the study of astronomy.

Hammett, J. L.: "Hammett's Planisphere," J. L. Hammett, Kendall Sq., Cambridge, Mass. Small size, $1.00; large size, $2.00. Useful in field sky study.

Johnson, Gaylord: "The Sky Movies," The Macmillan Co., 60 Fifth Ave., New York City. Reissued 1928, 170 pp., $1.50, J. Clever diagrams and photographs combined with a fairy tale to teach facts about the movement of the planets and the moon.

Johnson, Gaylord: "The Star People," The Macmillan Co., 60 Fifth Ave., New York City. Reissued 1928, 106 pp., $1.50, J. Star study for summer and winter, presented through drawings and diagrams connected with star myths.

Lewis, Isabel: "Astronomy for Young Folks," Duffield and Co., 211 E. 19th St., New York City. 1922, 267 pp., $2.00, A or J. One of the best of the modern books on astronomy for young people.

Lewis, Isabel E.: "Handbook of Solar Eclipses," Duffield and Co., 211 E. 19th St., New York City. 1924, 118 pp., $1.50, A.

Lewis, Isabel E.: "Splendors of the Sky," Duffield and Co., 211 E. 19th St., New York City. 1919, 343 pp., $2.00, A. An illustrated compilation of popular articles.

Luckiesh, Matthew: "Book of the Sky," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1922, 236 pp., $3.50, A. Handbook for sky study.

Luyten, W. J.: "The Pageant of the Stars," Doubleday, Doran and Co., Garden City, N. Y. 1929, 300 pp., $2.50, A. A splendid, up-to-date, popular book of authoritative star knowledge.

Macpherson, Hector: "Modern Astronomy—its Rise and Progress," Oxford University Press, 114 Fifth Ave., New York City. 1926, 195 pp., $2.25, A. Good accounts of discoveries.

Martin, M. E.: "The Friendly Stars," Harper and Brothers, 49 E. 33rd St., New York City. 1923, 265 pp., $2.00, A or J. An account of the more conspicuous stars and how they may be recognized.

Martin, M. E.: "The Ways of the Planets," Harper and Brothers, 49 E. 33rd St., New York City. 1912, 273 pp., $2.00, A or J. A simple, readable account.

McCabe, Joseph: "The Wonders of the Stars," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1923, 134 pp., $1.50, A. A simple manual of astronomy.

McFee, Inez N.: "Secrets of the Stars," Thomas Y. Crowell Co., 393 Fourth Ave., New York City. 1924, 286 pp., $1.75, J-8. An entertaining, rather than instructive, description of the constellations and of many star phenomena.

McKready, Kelvin: "A Beginner's Star Book," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 148 pp., $5.00, A. Beautifully illustrated guide with a superior series of maps and planet charts.

McKready, Kelvin: "A Beginner's Guide to the Stars," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 86 pp., $1.00, A. An abridged edition of "A Beginner's Star Book."

Newcomb, Simon: "Astronomy for Everybody," Garden City Publishing Co., Garden City, N. Y. New edition 1926, 333 pp., $1.00. A valuable old text for laymen.

Olcott, William Tyler: "The Book of Stars for Young People," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 412 pp., $3.00, J. A good book for the home library.

Olcott, William Tyler: "A Fieldbook of Stars," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1928, 164 pp., $1.50, A. A brief, non-technical book for the naked-eye observer.

Olcott, William Tyler: "Star Lore of All Ages," 1929, 453 pp., $4.50, A. "Sun Lore of All Ages," 1914, 346 pp., $4.50, A. G. P. Putnam's Sons, 2 W. 45th St., New York City. A collection of myths, legends and facts.

Olcott, William Tyler, and Putnam, Edmund W.: "Field Book of the Skies," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 534 pp., $3.50, A. A practical guide, containing also the main facts of astronomy and brief mythology.

Proctor, Mary: "Romance of the Comets," 1926, 210 pp., $2.50, A. "Romance of the Moon," 1929, 262 pp., $2.50, A. "Romance of the Planets, 1929, 272 pp., $2.50, A. Harper and Brothers, 49 East 33rd St., New York City. Sound scientific knowledge with some legends.

Proctor, Mary: "Stories of Starland," Silver, Burdett and Co., 39 Division St., Newark, N. J. 1898, 185 pp., $.80, J-3, 4. Legends and poems.

Proctor, Mary: "Young Folks' Book of the Heavens," Little, Brown and Co., 34 Beacon St., Boston. 1925, 256 pp., $2.00, A or J. Dependable.

Serviss, Garrett P.: "Around the Year with the Stars," Harper and Brothers, 49 E. 33rd St., New York City. 1923, 147 pp., $2.00, A. Seasonal star study.

Serviss, Garrett P.: "Astronomy with an Opera-Glass," D. Appleton and Co., 35 W. 32nd St., New York City. 1888, 158 pp., $3.00, A. A popular guide especially useful in the latitude of New York.

Serviss, Garrett P.: "Astronomy with the Naked Eye," Harper and Brothers, 49 E. 33rd St., New York City. 1923, 247 pp., $3.00, A. A popular guide, especially useful in the latitude of New York.

Serviss, Garrett P.: "Astronomy in a Nut-Shell," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1926, 261 pp., $1.75, A. For older amateur astronomers.

Serviss, Garrett P.: "The Story of the Moon," D. Appleton and Co., 35 W. 32nd St., New York City. 1928, 248 pp., $3.00, A. New edition of an interesting popular book.

Shapley, Harlow, and Howarth, H. E.: "A Source Book in Astronomy," McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City. 1929, 412 pp., $5.00, A. A splendid reference for those who are interested in presentation of original documents.

Smart, W. M.: "Sun, Stars and the Universe," Longmans, Green and Co., 55 Fifth Ave., New York City. 1928, 303 pp., $4.00, A. A semi-technical descriptive account of modern astronomy.

Thomas, Oswald: "Heaven and Earth, A Modern Astronomy," W. W. Norton Co., Inc., 70 Fifth Ave., New York City. 1930, 231 pp., A. Interesting.

Turner, H. H.: "A Voyage in Space," The Macmillan Co., 60 Fifth Ave., New York City. Second edition, 1926, 344 pp., $3.00, A. A uniquely valuable picture of how men have learned about space.

Physics and Chemistry

ALLEN, ELMER L.: "Model Airplanes: How to Build and Fly Them," Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. 1928, 326 pp., $3.50, A. Carefully diagrammed guide for enthusiasts.

ANDRADE, E. NDAC: "Engines," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1928, 267 pp., $3.00, A. Engines interestingly classified.

BROWNLEE, R. B.; FULLER, R. W.; HANCOCK, W. J.; SOHON, M. D.; and WHITSIT, J. E.: "Elementary Principles of Chemistry," Allyn and Bacon, 50 Beacon St., Boston. Revised edition, 1926, 596 pp., $1.60, HS. Good beginning text.

BRUCE, GEORGE HOWARD: "High School Chemistry," World Book Co., Yonkers-on-Hudson, N. Y. 1928, 550 pp., $1.68, HS. Formal text.

COOLIDGE, ALBERT S.: "Building a Model Railroad," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 183 pp., $2.00, J. A book of careful directions for use by boys and girls. Valuable for any general science teacher.

DARROW, FLOYD L.: "The Story of Chemistry," Bobbs-Merrill Co., 18 University Sq., Indianapolis, Ind. 1930, 561 pp., $5.00, A. Very adequate readable survey of modern chemistry.

DARROW, FLOYD L.: "The New World of Physical Discovery," Bobbs-Merrill Co., 18 University Sq., Indianapolis, Ind. 1930, 384 pp., $3.50, A. A most readable discussion of modern developments and discoveries.

FABRE, HENRI: "Wonder Book of Chemistry," The Century Co., 353 Fourth Ave., New York City. 1922, 385 pp., $2.50, J-7, 8. Excellent child's book on chemistry.

FINDLAY, ALEXANDER: "Chemistry in the Service of Man," Longmans, Green and Co., 55 Fifth Ave., New York City. 1925, 314 pp., $2.50, A. A layman's reader duplicating many elementary texts.

FLETCHER, G. L.; SMITH, H. O.; and HARROW, B.: "Beginning Chemistry," 1929, 476 pp., $1.60, HS, "Laboratory Manual," $.76, American Book Co., 88 Lexington Ave., New York City.

GARBER, PAUL E.: "Building and Flying Model Aircraft," Ronald Press Co., 15 E. 26th St., New York City. 300 pp., $2.25. An official book of the Playground and Recreation Association of America.

GORDON, NEIL E.: "Introductory Chemistry," World Book Co., Yonkers-on-Hudson, N. Y. 1927, 608 pp., $2.20, HS.

HOWE, H. E., EDITOR: "Chemistry in Industry," Chemical Foundation, Inc., 85 Beaver St., New York City. 1924-25, 2 vols., 764 pp., A. A collection of accounts of the relation of chemistry to various modern industries.

IRVIN, F. C.; RIVETT, B. J.; and TATLOCK, O.: "Beginning Chemistry," Row, Peterson Co., Evanston, Ill. 1927, 607 pp., $2.00, A.

KEELOR, KATHARINE: "Working with Electricity," The Macmillan Co., 60 Fifth Ave., New York City. 1929, 111 pp., $1.75, J. Experiments and explanations for 8 to 10-year-olds.

MEISTER, MORRIS: "Magnetism and Electricity," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1929, 210 pp., $1.00, J-8. Very valuable and practical information and study suggestions.

PARKER, BERTHA M.: "The Book of Electricity," Houghton, Mifflin and Co., 2 Park St., Boston. 1928, 314 pp., $.92, J-6 to 8. A science reader, containing simple explanations of electrical phenomena.

READ, HELEN S.: "A Story about Boats," "An Airplane Ride," "An Engine's Story," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1928, 37-37-35 pp., J-1, 2. Three books of a series, "Social Science Readers," illustrated in color and to be read by the children.

Romer, A. Ralph, and Romer, Margaret: "Sky Travel," Rand McNally and Co., 538 S. Clark St., Chicago. 1929, 302 pp., J. A satisfactory boys' book of airplanes.

Slosson, E. E.: "Creative Chemistry," Garden City Publishing Co., Garden City, N. Y., 1929, 300 pp., $1.00, A. Popular discussion very interestingly written.

Starling, S. G.: "Electricity in the Service of Man," Longmans, Green and Co., 55 Fifth Ave., New York City. 1922, 252 pp., $3.75, A. A general reader's account of industrial applications of electricity.

Stieglitz, Julius, editor: "Chemistry in Medicine," Chemical Foundation, Inc., 85 Beaver St., New York City. 1928, 757 pp., $2.00, A. For the intelligent and interested layman.

LITERATURE OF SCIENCE

Biography and History

Bradford, Gamaliel: "Charles Darwin," Houghton, Mifflin and Co., 2 Park St., Boston. 1926, 314 pp., $3.50, A. A very interesting biography.

Caldwell, O. W., and Slosson, E. E.: "Science Remaking the World," Doubleday, Doran and Co., Garden City, N. Y. 1923, 292 pp., published in a $1.00 edition by Garden City Publishing Co., Garden City, N. Y. Unusually interesting short sketches.

Cooper, Lane: "Louis Agassiz as a Teacher," Slingerland-Comstock Co., Ithaca, N. Y. 1917, 74 pp., $1.00, A. A stimulating essay for any teacher's reading.

Darrow, F. L.: "Masters of Science and Invention," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1923, 352 pp., $2.25, J. Biographies of famous scientists and inventors.

Darrow, Floyd L.: "Thinkers and Doers," Silver, Burdett and Co., 39 Division St., Newark, N. J. 1925, 385 pp., $1.16, J-5, 6, 7. An interesting history of invention, starting with the discoveries of primitive men.

DeKruif, Paul: "Hunger Fighters," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1928, 376 pp., $3.00, A. Short dramatically told sketches about food discoveries.

DeKruif, Paul: "Microbe Hunters," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1927, 363 pp., $3.50, A. Exceedingly interesting sketches of twelve scientists.

Downing, Elliot R.: "Science in the Service of Health," Longmans, Green and Co., 55 Fifth Ave., New York City. 1930, 332 pp., $2.00, J-8, 9. Interesting historical and biographical material.

The Engineering Foundation: "Popular Research Narratives," The Williams and Wilkins Co., Baltimore, Md. 1924, 1926, 1929, 3 vols., $1.00 each, A. Each volume contains 50 short "tales of discovery, invention and research."

Fabre, Abbe Augustin: "The Life of Jean Henri Fabre," Dodd, Mead and Co., 443-449 Fourth Ave., New York City. 1921, 398 pp., $2.50, A. A very delightful account of an interesting life.

Gibson, C. R.: "Great Inventions and How They were Invented," J. B. Lippincott Co., Washington Sq., Philadelphia. 1924, 240 pp., $2.50, A.

Gibson, C. R.: "Heroes of the Scientific World," J. B. Lippincott Co., Washington Sq., Philadelphia. 1930, 344 pp., $2.50, A. Brief accounts of famous scientists.

Gravatt, Lila: "Pioneers of the Air," Mentzer, Bush and Co., 2210 S. Park Ave., Chicago. 1928, 264 pp., $.80, J. A simple book on the history of flying.

Hawks, E., and Boulger, G. S.: "Pioneers of Plant Study," The Macmillan Co., 60 Fifth Ave., New York City. 1928, 288 pp., $4.00, A. Sketches of the lives and times of both ancient and modern botanists.

Harrow, Benjamin: "Eminent Chemists of our Time," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1927, 471 pp., $3.00, A. Interesting sketches of the life and work of eleven outstanding chemists of the present age.

Hart, I. B.: "Makers of Science, Mathematics, Physics, Astronomy," Oxford University Press, 114 Fifth Ave., New York City. 1923, 320 pp., $2.00, A. A series of interesting biographies arranged to bring out some of the broader movements in the history of these sciences.

Harwood, W. S.: "New Creations of Plant Life," The Macmillan Co., 60 Fifth Ave., New York City. Reissued 1921, 430 pp., $2.00, A. "An Authoritative Account of the Life and Works of Luther Burbank."

Hering, D. W.: "Foibles and Fallacies of Science," D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City. 1924, 307 pp., $2.50, A. A study of the pseudo-science of all times.

Herrick, Francis Hobart: "Audubon, the Naturalist," D. Appleton and Co., 35 W. 32nd St., New York City. 2 vols. 1917, 944 pp., $10.00, A. One of the best biographies of Audubon.

Holland, M.: "Industrial Explorers," Harper and Brothers, 49 East 33rd St., New York City. 1928, 347 pp., $3.00, A.

Jordan, David Starr: "The Days of a Man," World Book Co., Yonkers-on-Hudson, New York. 1922, 710 pp., popular edition, $15.00 per set, De Luxe edition, $40.00, A. A delightful autobiography and a versatile observer's picture of the last half century.

Jordan, D. S., editor: "Leading American Men of Science," Henry Holt and Co., 1 Park Ave., New York City. 1910, 471 pp., $3.00, A. A series of short biographical sketches by several authors.

Knickerbocker, W. S., editor: "Classics of Modern Science," Alfred A. Knopf, Inc., 730 Fifth Ave., New York City. 1927, 384 pp., $2.50, A. Inspiring source material from four centuries of master scientists.

Lansing, Marion F.: "Great Moments in Science," Doubleday, Doran and Co., Garden City, New York. 1926, $2.50, A. Popular sketches of discovery and invention through the ages.

Law, F. H.: "Science in Literature," Harper and Brothers, 49 E. 33rd St., New York City. 1929, 364 pp., $1.20, A. A collection of literary essays for the most part from the pens of outstanding scientists.

Libby, Walter: "An Introduction to the History of Science," Houghton, Mifflin and Co., 2 Park St., Boston. 1917, 288 pp., $2.35, HS. A simple story of the origin and development of modern science.

Locy, William A.: "Biology and its Makers," Henry Holt and Co., 1 Park Ave., New York City. 1928, 477 pp., $3.00, A. Classic on the subject.

Locy, William A.: "The Growth of Biology," Henry Holt and Co., 1 Park Ave., New York City. 1925, 481 pp., $4.00, A. Worth reading.

Lodge, Sir Oliver: "Pioneers of Science," The Macmillan Co., 60 Fifth Ave., New York City. 1927, 404 pp., $2.50, A. Most entertaining presentation of the history and progress of astronomy.

McFee, Inez N.: "Stories of American Inventions," Thomas Y. Crowell Co., 393 Fourth Ave., New York City. 1920, 286 pp., $1.75, J-6. Simple material about some inventors and their work.

MILLIKAN, ROBERT A.: "Science and the New Civilization," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1930, 194 pp., $2.00, A. A series of lectures in defense of science, pure and applied.

MOWRY, WILLIAM A., and ARTHUR MAY: "American Inventions and Inventors," Silver, Burdett and Co., 39 Division St., Newark, N. J. 1900, 304 pp., $.96, J-5, 6, 7, 8. Interesting to show progress in the past thirty years.

MUIR, JOHN: "The Boyhood of a Naturalist," Houghton, Mifflin and Co., 2 Park St., Boston. Riverside Literature Series, 123 pp., $.44, J-9. Selected chapters from "The Story of My Boyhood and Youth."

MUIR, JOHN: "The Story of My Boyhood and Youth," Houghton, Mifflin and Co., 2 Park St., Boston. 1913, 293 pp., $3.50, A. Interesting autobiography.

MUSCHAMP, EDWARD A.: "Audacious Audubon," Brentano's, 225 Fifth Ave., New York City. 1929, 312 pp., $3.50, A. A delightful story of a great pioneer, artist, naturalist and man.

PARKMAN, M. R.: "Conquests of Invention," The Century Co., 353 Fourth Ave., New York City. 1921, 413 pp., $2.00, J-6. Interesting and stimulating accounts of the achievements of some twenty modern inventors

PHILLIPS, MARY GEISLER, and GEISLER, WILLIAM H.: "Glimpses into the World of Science," D. C. Heath and Co., 285 Columbus Ave., Boston. 1929, 337 pp., A. Sketches in many fields of science and biography drawn partly from the writings of eminent scientists.

PUPIN, MICHAEL: "From Immigrant to Inventor," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1923, 396 pp., $2.00. HS, A.

SLOSSON, EDWIN E.: "Keeping up with Science," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1924, 355 pp., $2.50, A. A vivid and interesting account of developments in modern science told by a recognized authority.

SLOSSON, EDWIN E.: "Chats on Science," The Century Co., 353 Fourth Ave., New York City. 1924, 273 pp., $2.00, J-7, 8. Interesting reading.

SPEED, JAMES: "Ten Outdoor Men," D. C. Heath and Co., 285 Columbus Ave., Boston. 1929, 143 pp., $.72 J-6 to 8. Sketches of the lives of Washington, Wilson, Audubon, Roosevelt, Webster, Jefferson, Burbank, Johnny Appleseed, Burroughs and Muir.

TRACY, HENRY CHESTER: "American Naturists," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1930, 282 pp., A. Stimulating sketches of a group of American students and writers of nature.

TURNER, L. M.: "Makers of Science: Electricity and Magnetism," Oxford University Press, 114 Fifth Ave., New York City. 1927, 199 pp., $2.50, A. Historical and biographical material for young students and general readers.

WHITE, ANDREW D.: "A History of the Warfare of Science with Theology in Christendom," D. Appleton and Co., 35 W. 32nd St., New York City. 1923, 889 pp., $6.00, A.

WIGGAM, ALBERT E.: "The New Decalogue of Science," Garden City Publishing Co., Garden City, New York. 1923, 303 pp., $1.00, A. Points out the possibilities of science applied to politics and government.

VALLERY-RADOT, RENE: "The Life of Pasteur," Garden City Publishing Co.. Garden City, New York. 1927, 484 pp., $1.00, A. One of the better biographies.

MURRAY, R.: "Science and Scientists in the Nineteenth Century," The Macmillan Co., 60 Fifth Ave.. New York City. 1925, 450 pp., $5.00, A. A survey of value for a school library.

WOODRUFF, L. L., and OTHERS: "The Development of the Sciences," Yale University Press, New Haven, Conn. 1923, 327 pp., $3.50, A. A summary of value for a school library.

Travel

Andrews, Roy Chapman: "Ends of the Earth," G. P. Putnam's Sons, 2 W. 45th St., New York City. 1929, 355 pp., $4.50, A. A thrilling tale of ten years spent on whaling ships.

Andrews, Roy Chapman: "Whale Hunting with Gun and Camera," D. Appleton and Co., 35 W. 32nd St., New York City. 1916, 333 pp., $5.00, A.

Beebe, C. W.: "The Arcturus Adventure," 1928, 439 pp., $6.00, A. "Beneath Tropical Seas," 1929, 234 pp., $3.50, A. "Galapagos, World's End," 1928, 443 pp., $5.00, A. "Jungle Days," 1927, 205 pp., $3.00, A. "Pheasant Jungle," 1927, 248 pp., $3.00, A. G. P. Putnam's Sons, 2 W. 45th St., New York City. Popular accounts of scientific expeditions to many lands and seas.

Beebe, C. W.: "Jungle Peace," 1928, 297 pp., $2.50, A. "Edge of the Jungle," 1927, 303 pp., $2.50, A. "Log of the Sun," 1926, 321 pp., $5.00, A. Henry Holt and Co., 1 Park Ave., New York City. Popular accounts of scientific expeditions. The last two published also by Garden City Publishing Co., Garden City, N. Y., 1925-1927, 303, 321 pp., $1.00 each.

Beston, Henry: "The Outermost House, a year of life on the great beach of Cape Cod," Doubleday, Doran and Co., Garden City, N. Y. 1929, 222 pp., $3.00, A. Interesting chronicle of nature and life.

Clark, James L.: "Trails of the Hunted," Little, Brown and Co., 34 Beacon St., Boston. 1928, 309 pp., $4.00, A. Accounts of hunting "big game," by a member of the staff of the American Museum of Natural History.

Darwin, Charles: "Voyage of the Beagle," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1920, 496 pp., $.90, A. An epoch-making account of a naturalist's explorations.

Fairchild, David: "Exploring for Plants," The Macmillan Co., 60 Fifth Ave., New York City. 1930, $5.00, A. Accounts of experiences in many lands, in search of plants which could be introduced in the United States.

Heming, Arthur: "The Living Forest," Doubleday, Doran and Co., Garden City, N. Y. 1926, 268 pp., $2.00, J or A. Camp and field hints artificially interwoven with a story of two boys.

Hornaday, William T.: "Camp Fires on Desert and Lava," 1908, 366 pp., $5.00, HS or A. "Camp Fires in the Canadian Rockies," 1906, 353 pp., $5.00, HS or A. Charles Scribner's Sons, 597 Fifth Ave., New York City. Adventures, incidents of camp life and sketches of wild life.

James, George Wharton: "Our American Wonderlands," A. C. McClurg and Co., 333 E. Ontario St., Chicago. 1915, 297 pp., $3.75, A. Well-illustrated descriptions.

Mills, Enos A.: "Wild Life in the Rockies," Houghton, Mifflin and Co., 2 Park St., Boston. 1909, 263 pp., $2.50, A. Interesting records of the author's experiences in the wilds.

Mills, Enos A.: "Your National Parks," Houghton, Mifflin and Co., 2 Park St., Boston. 1917, 431 pp., $3.00, A. Well-written plea for preservation of natural wonderlands.

Muir, John: "The Mountains of California," 1911, 389 pp., $3.50, A. "The Yosemite," 1912, 284 pp., $3.50, A. The Century Co., 353 Fourth Ave., New York City. Interesting and well-told accounts of the exploring trips of a renowned natural scientist.

Muir, John: "My First Summer in the Sierras," 1911, 354 pp., $3.50, A. "Travels in Alaska," 1915, 326 pp., $3.25, A. Houghton, Mifflin and Co., 2 Park St., Boston. Interesting and well-told accounts of the exploring trips of a renowned natural scientist.

Muir, John: "Our National Parks," Houghton, Mifflin and Co., 2 Park St., Boston. 1909, 382 pp., $3.50, A. Muir's plea for appreciation and conservation of national parks.

Quinn, Vernon: "Beautiful America," 1923, 333 pp., $4.00, A. "Beautiful Canada," 1925, 382 pp., $4.00, A. "Beautiful Mexico," 1924, 398 pp., $4.00, A. Frederick A. Stokes Co., 443-449 Fourth Ave., New York City. Descriptions of the natural beauty and scenic wonders of America.

Rolfe, Mary A.: "Our National Parks," Benjamin H. Sanborn and Co., 220 E. 20th St., Chicago. Book 1, 1928, 320 pp., $1.00, J. Book 2, 1929, 330 pp., $1.00, J. Descriptions, through the fabric of a story of two families and their visits to the various parks.

Van Dyke, John: "The Desert," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1918, 233 pp., $3.00, HS or A. Studies in "natural appearances."

Van Dyke, John: "The Grand Canyon and the Colorado," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1920, 218 pp., $2.50, HS or A. A scientific interpretation rather than a guide.

Yard, Robert Sterling: "The Book of the National Parks," Charles Scribner's Sons, 597 Fifth Ave., New York City. New edition, 1926, 420 pp., $3.00, A. Treats the subject educationally, scientifically, historically and scenically.

Essays

Austin, Mary: "The Land of Little Rain," Houghton, Mifflin and Co., 2 Park St., Boston. New edition, 281 pp., $3.00, A. Charmingly written essays.

Blatchley, Willis Stanley: "Gleanings from Nature," The Nature Publishing Co., 1558 Park Ave., Indianapolis, Ind. 1899, 348 pp., $1.50, A. Short accounts of insects, fishes, reptiles, birds and plants of Indiana and adjacent states.

Bryant, Harold Child: "Outdoor Heritage," Powell Publishing Co., Los Angeles, Calif. 1929, 465 pp., $5.00, A. The conservation and recreation unit of a series of excellent books about California.

Burroughs, John: "Fresh Fields," 1895, 284 pp., $2.25, A. "Leaf and Tendril," 1908, 288 pp., $2.25, A. "Locusts and Wild Honey," 1907, 235 pp., $2.25, A. "Signs and Seasons," 1886, 271 pp., $2.25, A. "Ways of Nature," 1905, 279 pp., $2.25, A. "Winter Sunshine," 1875, 241 pp., $2.25, A. Houghton, Mifflin and Co., 2 Park St., Boston. Collections of charming essays by a famous nature writer.

Fuller, Raymond T.: "Walk, Look and Listen," John Day Co., Inc., 386 Fourth Ave., New York City. 1929, 295 pp., $2.50, A. A help for parents and teachers in planning nature study and walks with children.

Jefferies, Richard: "Field and Hedgerow," Longmans, Green and Co., 55 Fifth Ave., New York City. 1900, 331 pp., $2.25, A. Enjoyable sketches about familiar things, written by an English literary artist.

Jordan, David Starr: "The Book of Knight and Barbara," D. Appleton and Co., 35 W. 32nd St., New York City. 1926, 265 pp., $2.00, J-6, 7. Amusing little stories, "corrected and illustrated by the children" and printed in an attractive way.

Miller, Mary Rogers: "The Brook Book," Doubleday, Doran and Co., Garden City, New York. New edition, 1904, 241 pp., $2.50, A. Charming sketches recording "a first acquaintance with the brook and its inhabitants through the changing year."

ROOSEVELT, THEODORE: "A Book Lover's Holidays in the Open," Charles Scribner's Sons, 597 Fifth Ave., New York City. 1916, $3.00, HS or A. Essays on several phases of outdoor life.

SCOVILLE, SAMUEL, JR.: "Everyday Adventures," 1920, 241 pp., $2.50, A. "Wild Honey," 1929, 203 pp., $3.00, A. Little, Brown and Co., 34 Beacon St., Boston. Experiences with wild folk, entertainingly told.

SCOVILLE, SAMUEL, JR.: "Runaway Days," Harcourt, Brace and Co., 383 Madison Ave., New York City. 1927, 254 pp., $2.50, A. Companion book to "Everyday Adventures."

SHARP, DALLAS LORE: "The Fall of the Year," 1911, 126 pp., $1.00, J-8. "The Spring of the Year," 1909, 148 pp., $1.00, J-8. "Winter," 1912, 148 pp., $1.00, J-8. "Summer," 1914, 132 pp., $1.00, J-8. Houghton, Mifflin and Co., 2 Park St., Boston. A collection of Sharp's delightful essays for use as supplementary readers.

SHARP, DALLAS LORE: "The Face of the Fields," 1911, 260 pp., $2.00, A. "The Hills of Hingham," 1916, 221 pp., $2.00, A. "The Lay of the Land," 1908, 214 pp., $1.75, A. "Roof and Meadow." 1904, 281 pp., $2.00, A. Houghton, Mifflin and Co., 2 Park St., Boston. Collections of delightful essays on nature subjects.

SHARP, DALLAS LORE: "Sanctuary! Sanctuary!" Harper and Brothers, 49 East 33rd St., New York City. 1926, 227 pp., $2.50, A. A plea for appreciation of wild life.

THOREAU, HENRY DAVID: "Autumn," 1892, 470 pp., $2.75, A. "Canoeing in the Wilderness," 1916, 191 pp., $1.75, A. "Cape Cod," 1914, 336 pp., $2.00, A. "Early Spring in Massachusetts," 1881, 318 pp., $2.75, A. "The Maine Woods," 1892, 328 pp., $2.75, A. "Summer," 1884, 382 pp., $2.75, A. "Walden," 1893, 522 pp., $2.00, A. "A Week on the Concord and Merrimac Rivers," 1894, 530 pp., $2.75, A. "Winter," 1888, 439 pp., $2.75, A. Houghton, Mifflin and Co., 2 Park St., Boston. Among the best of Thoreau's contributions.

TORREY, BRADFORD: "The Clerk of the Woods," 1893, 280 pp., $2.00, A. "A Florida Sketchbook," 1924, 242 pp., $2.00, A. "Footing it in Franconia," 1901, 251 pp., $2.00, A. "The Footpath Way," 1892, 245 pp., $2.00, A. Houghton, Mifflin and Co., 2 Park St., Boston. Entertaining essays.

TOWNSEND, CHARLES WENDELL: "Beach Grass," Marshall Jones Co., 212 Summer St., Boston. 1923, 318 pp., $3.50, A. Interesting intimate studies of seashore life.

TOWNSEND, CHARLES WENDELL: "Sand Dunes and Salt Marshes," L. C. Page and Co., 53 Beacon St., Boston. 1925, 311 pp., $3.50, A. Attractive essays about sand dunes and salt marshes and their plant and animal life.

VAN DYKE, HENRY: "The Blue Flower," 1920, 271 pp., $2.50, Sylvanora edition, $1.00, HS or A. "Days Off," 1920, 293 pp., $2.50, Sylvanora edition, $1.00, HS or A. "Fisherman's Luck," 1920, 256 pp., $2.50, Sylvanora edition, $1.00, HS or A. "Little Rivers," 1920, 290 pp., $2.50, Sylvanora edition, $1.00, HS or A. Charles Scribner's Sons, 597 Fifth Ave., New York City. A nature lover's thoughts and reminiscences.

WALTON, IZAAK: "The Compleat Angler," E. P. Dutton and Co., Inc., 286-302 Fourth Ave., New York City. 1925, 215 pp., $1.00, A. Classic. (Everyman's Library.)

WARD, C. H.: "Exploring Nature," Henry Holt and Co., 1 Park Ave., New York City. 1927, 257 pp., $.92, A. Popular nature literature.

WHITE, GILBERT: "The Natural History of Selborne," Robert M. McBride and Co., 7 W. 16th St., New York City. 1925, 248 pp., $3.00, A. Interesting and accurate observations of a famous 18th century naturalist.

Poetry

BAILEY, LIBERTY HYDE: "Wind and Weather," The Macmillan Co., 60 Fifth Ave., New York City. 1923, 216 pp., $1.50, A. A book of poems about common things in nature.

CLARKE, FRANCES E.: "Poetry's Plea for Animals," Lothrop, Lee and Shepard Co., 275 Congress St., Boston. 1927, 426 pp., $3.00, A and J-8, 9. "An anthology of justice and mercy for our kindred in fur and feathers."

GROVER, EDWIN O.: "Animal Lover's Knapsack," Thomas Y. Crowell Co., 393 Fourth Ave., New York City. 1929, 308 pp., $2.50, HS. An anthology.

GROVER, EDWIN O.: "Nature Lover's Knapsack," Thomas Y. Crowell Co., 393 Fourth Ave., New York City. 1927, 304 pp., $2.50, HS. An attractive anthology.

RICHARDS, MRS. WALDO: "High Tide," 1916, 206 pp., $2.00, A. "The Melody of Earth," 1918, 295 pp., $2.00, A. "Star Points," 1921, 229 pp., $2.00, A. Houghton, Mifflin and Co., 2 Park St., Boston. Anthologies containing many worthwhile nature poems.

SCOLLARD, CLINTON, and RITTENHOUSE, JESSIE B.: "The Bird-Lover's Anthology," Houghton, Mifflin and Co., 2 Park St., Boston. 1930, 299 pp., cloth, $2.00, leather, $2.75, A. A new and attractive collection of poems.

WAIT, MINNIE C., and LEONARD, M. C.: "Among Flowers and Trees with the Poets," Lothrop, Lee and Shepard Co., 275 Congress St., Boston. 1901, 415 pp., $2.00, A and J-8, 9. An anthology.

WILLIAMS, SARAH: "Through the Year with Birds and Poets," Lothrop, Lee and Shepard Co., 275 Congress St., Boston. 1900, 323 pp., $2.00, A and J-8, 9. Poems for each month of the year.

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